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ECONOMIC ANALYSIS
OF
INTERSTATE HIGHWAY ROUTINGS

FROM

LIVINGSTON
TO
BILLINGS

PREPARED BY

PLANNING SURVEY DIVISION

AND

INTERSTATE DIVISION

OF

MONTANA STATE HIGHWAY COMMISSION

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PLANNING SURVEY DIVISION
HELENA, MONTANA

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ECONOMIC ANALYSIS OF ALTERNATE INTERSTATE SYSTEM HIGHWAY ROUTINGS BETWEEN LIVINGSTON AND BILLINGS

FOREWORD

This report has been prepared for the purpose of comparing the relative merits of alternate routings of the Interstate System highway in the general area between Livingston and Billings. The highway routing through this vicinity has been the subject of much controversy, and the intent of this analysis is to describe the principal features involved and to present economic data which will provide a basis for determining the most appropriate highway location.

THE INTERSTATE SYSTEM

The Interstate System was originally established under the Federal Aid Highway Act of 1944. It was defined as the National System of Interstate Highways, with a maximum size of 40,000 miles throughout the nation. It was specified that the system should be "so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers". The routes, which were selected in the State of Montana, consisted of the principal highways that were included in a more extensive war-time highway system defined as the Strategic Network. The designated Interstate System in Montana includes U.S. Highway No. 10 across the State from west to east, U.S. Highway No. 91 across the State from south to north, and U.S. Highway No. 87 south from Billings to the Wyoming line.

This original system was included as part of the Federal Aid Primary System, and, with minor exceptions, the system was treated the same as the Primary System. It later became evident, however, that the nationwide interest in the Interstate System made it necessary that it be granted special attention both in financing and in expediting the construction of the system to adequate standards to serve the anticipated great increase in traffic volumes. Action to accomplish this objective was contained in legislation as part of the Federal Aid Highway Act of 1956.

Under this act, the name of the system was changed to the National System of Interstate and Defense Highways. It was stipulated that the Interstate System should be "completed as nearly as practicable over a thirteen year period". The national interest in the system was recognized by means of greatly increased authorizations of Federal Aid to assist in the construction of the system and also in liberalization of the proportion of Federal money as compared to State money. Much higher standards were prescribed for the construction of this system, and one desirable feature, which was an

innovation for the State of Montana, involved the control of access to the highways so that traffic could move safely and expeditiously.

In a declaration of policy it was stated that "It is further declared that one of the most important objectives of this act is the prompt completion of the Interstate System. Insofar as possible in consonance with this objective, existing highways located on an interstate route shall be used to the extent that such use is practicable, suitable and feasible, it being the intent that local needs, to the extent practicable, suitable and feasible, shall be given equal consideration with the needs of interstate commerce."

Section 108 (d) of this act required that each state make an estimate of the cost of completing the system to the prescribed standards. In order to accomplish this objective, it was necessary that the approximate final location of the highway system be determined so that a reliable estimate could be made of the cost of constructing the highways. A thorough investigation of highway location and construction needs was made, and the results were published in a volume which was sent to the Bureau of Public Roads and was used by Congress in determining the apportionment of Interstate System construction funds to the various states.

The highway routings contained in the Section 108 (d) Study were accepted as the recommended locations, subject to modification after detailed review of special sections.

PRINCIPAL CONSIDERATIONS IN LOCATION

The following are some of the principal points which must be considered in determining the most favorable location for an Interstate System highway:

1. INTERSTATE TRAFFIC SERVICE - Being a portion of a nationwide system of interstate highways, it is evident that considerable importance should be assigned the service which the highway will provide for the interstate movement of traffic.

2. DEFENSE SERVICE - The importance of these highways from a military standpoint should not be under emphasized. The importance to civil defense and as evacuation routes is also very great. It should be realized, however, that these functions will never be effective unless another war or similar emergency arises. For this reason, the military and civil defense aspects assume secondary importance in relation to the need for serving regular highway traffic.

3. THE HIGHWAY USER - Practically the entire cost of this system of highways is being paid by the highway user in the form of Federal excise taxes to the Federal Highway Trust Fund and the motor fuel and gross vehicle weight taxes which are paid into the State Highway Fund in Montana. It is imperative, therefore, that the highways be located in such a manner that they will provide the best possible service to the highway user.

4. THE LOCAL PROPERTY OWNER - Depending on the location, the local property owner may be either helped or harmed by the highway routing. Several studies in other states have proved that urban or suburban properties adjacent to freeways experience a substantial increase in value upon construction of a new facility. Such locations are desirable for industrial, commercial and even residential sites. In Montana, the increase in value should apply especially to land adjacent to the larger cities and to land in the vicinity of interchanges near these cities.

A different situation may apply to property which falls in the line of the new highway. There is an understandable reluctance on the part of a home owner to relinquish his residence which he may have improved over a period of years and to which he has become deeply attached. Although adequate financial compensation will be paid for the value of his property, there is no means of compensating him for sentimental values or the difficulty of becoming re-established in another neighborhood. On the other hand, an owner of old and deteriorated property might be happy to sell what would otherwise be a doubtful asset.

The taking of farm land generally represents a serious situation in the State of Montana. Where the new highway requires a strip of land along the outer edge of the property, the damage is not too great, provided that the access is not restricted too severely. Also, there is not too much difficulty in acquiring right-of-way through grazing or other land of moderate productivity.

The opposition to releasing further right-of-way occurs in instances where an already small farm or ranch is further reduced or divided by a new highway location. Other instances occur where the highway traverses irrigated land, thereby disrupting the balance between forage crops and the amount of grazing land that can be utilized. The restriction of access to segregated areas also works a hardship .

5. COMMERCIAL ESTABLISHMENTS - Many commercial establishments such as eating places, service stations, and motels must depend upon highway traffic for the greater part of their business. The desirability of such sites generally depends upon the proximity, or at least ready access, to busy highways. The construction of a new highway a short distance from the existing highway should not seriously affect these places, especially if the old highway is retained on the system or serves as a frontage road to the new highway. The fact that commercial establishments are not permitted within the right-of-way of a controlled access highway also helps to preserve the status of existing establishments.

A different situation occurs, however, where a new highway is located a substantial distance from an existing highway and the traffic pattern is radically changed. Under these conditions, the existing establishments along the old highway will probably lose a great part of their business. Unfortunately, the business man cannot be compensated for any loss of business as the result of highway relocation, and he is less fortunate than

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the farmer, rancher, residence owner, or other property owner who is compensated for the property which is required for right-of-way purposes.

In a radical highway relocation, the loss of business to existing establishments could amount to a very substantial sum, and the point could be reached where the entire property would be seriously depreciated.

These considerations apply to the Interstate System in general, and they have an important bearing on the highway location between Livingston and Billings.

SELECTED HIGHWAY ROUTINGS

As mentioned before, Section 108 (d) of the Federal Aid Highway Act of 1956 specified that an estimate be made of the costs of bringing the Interstate System up to the prescribed standards. In order to accomplish this, it was necessary that the locations be defined, and these locations were approved as a part of the Section 108 (d) Study.

At a later date, a more detailed study was made with respect to the situation in the vicinity of Billings in order to determine the most favorable route through the developed area between Park City and Huntley. In this analysis, which was published as of August 29, 1956, two principal routes were considered.

A South Route left the present highway in the vicinity of Park City, crossed the railroad tracks and extended in a northeasterly direction on a location a short distance south of the present highway. The line deviated south of Laurel and Billings in order to miss the more developed portions of these cities. The new line coincided with the existing highway for most of the distance between Laurel and Billings.

A North Route was studied which left the common terminus near Park City and extended in a northeasterly direction along the north side of Laurel, climbed on top of the rimrocks north of Billings and extended easterly through the Huntley irrigation project.

This analysis favored the southern location for the Interstate System highway through this area.

Another analysis was made concerning the Interstate System location in the vicinity of Livingston. In this analysis, two alternates were considered, with both of them being located on the southern side of the city. The analysis favored the route which was farthest south and on the opposite side of the Yellowstone River from the city.

As the result of several hearings and meetings with people in these cities and in the rural portion of the Yellowstone River valley, it

became evident that there would be considerable opposition to a routing requiring additional right-of-way through the developed portion of the valley. The following principal points were presented in opposition to the Section 108 (d) routing:

1. A substantial amount of additional right-of-way would be required because of the higher standards of the new highway and the necessity of relocating significant lengths in order to meet prescribed standards of grade and alignment.

2. The controlled access features of the new highway would make it necessary that some of the local residents travel greater distances to get on the highway. It would also eliminate the present practice of trailing cattle along the highway in moving from one ranch to another or to the summer grazing lands.

3. Freedom to cross the highway at any point would be curtailed, and it would be more difficult to move stock and equipment from one portion of a farm or ranch to another portion where the highway separated sections of the unit.

4. The irrigable land of the valley was limited and was being used to the fullest extent. Many of the units could operate efficiently only if there was sufficient hay land to feed the number of livestock that could be grazed on the remainder of the land. The taking of additional irrigated land for right-of-way purposes would disrupt the economic balance of many units.

In an effort to find a compromise routing, the Interstate Division investigated an alternate line between Livingston and Laurel, on the north and opposite side of the river from the Section 108 (d) line. Very preliminary evaluations reflected that this route would provide much less service to traffic, with no substantial savings in costs and it was also opposed by the ranchers for the reason that it also involved a substantial amount of irrigated land.

The matter of the Yellowstone River valley routing was reviewed by a special House Highway Investigation Committee as a part of its functions. In the report of this committee, it was recommended that another line be investigated between Livingston and Billings. This line left the present highway at a point west of Livingston and extended in a northeasterly direction on the north side of the Yellowstone River to a point of junction with Montana Highway No. 19 north of Big Timber. From this point, the suggested route extended easterly in a direct line to Billings and passed along the north edge of this city on a line under the rimrocks. It crossed the Yellowstone River at a point east of Billings and ended at a point of common terminus with the Section 108 (d) line east of Billings.

This proposed line was reviewed by the Programming Engineer, who recommended that the line from Big Timber to Billings be modified to the

extent that it be moved southward for a distance of about five miles to follow a township line which led directly to Billings. The location of the proposed north route was also inspected by the Interstate Division, and on the basis of reconnaissance and aerial photographs, minor modification to the township line was suggested to take better advantage of the natural terrain.

The Interstate Division also proposed an alternate routing of the eastern end of the north line which would divert in a southeasterly direction and join the present highway and the Section 108 (d) line at a point a short distance east of Laurel. This change in location had the advantage that it would reduce the amount of and the duplication of highway mileage to serve the traffic into Billings.

It would be possible to develop several other alternate lines of variable deviation from the suggested lines, but it is felt that such alternates would produce only minor changes in the comparative results. For this reason, this analysis is being confined to the following:

1. The Section 108 (d) line which will be identified hereafter as the SOUTH ROUTE. Since this route would be longer, would require more separation and interchange structures, more frontage roads, and two extra Yellowstone River bridges, it would undoubtedly cost more to construct and to maintain. This route would, however, serve both the through traffic between major cities and the local traffic originating in the communities, farms and residences along the populated river valley. Under these circumstances, it would be necessary to construct and maintain only one highway through the corridor.

2. The proposed line recommended in the Investigating Committee Report with the modifications suggested by the Programming Engineer and the Interstate Division. This will be identified as the NORTH ROUTE. It would have the advantage of shorter length with consequent lower construction and maintenance costs. Also, since the route would traverse a more poorly developed area, there would be reduced requirements for separation and interchange structures and frontage roads. Because of the shorter travel distance, this route would save the through traffic a substantial amount of travel costs. It would also provide an improved highway for the local residents in this vicinity who are now traveling on substandard roads. This route has the disadvantage that it would not be of any value to traffic having an origin or destination at intermediate points between Big Timber and Billings. For this reason, it would be necessary to have two separate highways; a North Route to serve through traffic, and a South Route to serve the local river valley traffic.

3. A NORTH ALTERNATE ROUTE which would be identical with the location of the North Route from the western terminus to a point in the vicinity of the Halfbreed Lake Wildlife Refuge. At this point the line would divert in a southeasterly direction and would meet the South Route at a point east of Laurel. The route would then follow the same line as

the South Route to the eastern terminus. The North Alternate Route would have the advantage of eliminating the need for duplicate highway mileage in the Laurel to Billings area.

The locations of these routes are shown on the enclosed map.

ECONOMIC FACTORS

Economic factors and other considerations contribute greatly to the need for highway facilities and the amount of traffic generated on these facilities. Traffic generation is usually related directly to such items as population, motor vehicle registrations, land use, productivity of land, distance between population centers and the trading areas, and similar factors. It is necessary that some of these factors be reviewed as an aid in defining the general problem of route selection.

The present highway between Livingston and Billings follows quite closely the course of the Yellowstone River. This river has been the principal contributory feature in the development of this general area. It was used on the return trip by Captain Clark and his group from the Lewis and Clark Expedition. Shortly thereafter, fur trading posts were established along this stream. Steamboats reached points in the vicinity of the present site of Billings, and smaller boats were used in the transportation of furs down stream from the upper reaches of the river.

Early game and Indian trails followed the easier route through the river valley. The early wagon roads of John Bozeman and Jim Bridger took advantage of the water level route on the Yellowstone River above Columbus in establishing a route to the gold fields of southwestern Montana.

Some sporadic attempts were made to settle the Yellowstone River valley in this vicinity during the 1870's, but it was not until the Northern Pacific Railway pushed through the area in the early 1880's that the region achieved any significance. As the previous modes of transportation had done, this railroad followed the Yellowstone River valley because of the easy grade and favorable terrain. Communities became established at strategic points along the railroad, and the availability of adequate transportation facilities encouraged the settlement and development of the general area. Every city of importance in the Yellowstone River valley owes its existence and early growth to the coming of the railroad.

The early activity was confined almost exclusively to livestock raising. There was a vast amount of land available for grazing during open weather, but as was learned during the winter of 1887 when thousands of cattle starved, it was essential that adequate hay be available for winter feeding. The abundant supply of water in the river valley permitted irrigation which is so essential to the growth of hay. Before long, a vigorous livestock industry had become established in the river valley on the basis of the abundant water and hay crops. The greater part of the

area between Park City and Livingston still has livestock raising as the principal agricultural pursuit; however, the fertile, level, irrigated land between Park City and Billings is now used mostly for the production of the more profitable crops such as sugar beets and truck crops.

The availability of adequate and cheap water has contributed greatly to the population and industrial growth of the region. There is a great amount of water required for household purposes in cities the size of Livingston, Laurel and Billings. Adequate water is also essential for such industries as the oil refineries at Laurel and Billings and the sugar factory at Billings.

The early development of the Yellowstone River valley occurred as the result of the construction of the railroad through the area. Settlement followed along the railroad where adequate water was available from the river, and communities sprang up at strategic points to become railheads and trading centers. With the advent of the motor vehicle, transportation modes changed significantly. Whereas produce and livestock had been moved to the closest rail point, it was now possible to move farm products by truck to better markets at central points. Railroad passenger service also dwindled as automobiles came into use for increasingly longer trips.

Gradually, roads were extended outward from the principal cities and communities, and it soon became evident that a network of highways was necessary to provide the proper connections between communities. This resulted in the establishment of a State highway system with the Yellowstone River valley route becoming a part of Federal Aid Route 2 and U.S. Highway No. 10. There has been a great buildup of traffic on this highway since its oiling in the early 1930's, and U.S. Highway No 10 across the State is the principal highway artery in the State. The portion of this highway between Laurel and Billings is the most heavily traveled section of rural highway in Montana.

The railroad through the area provided the initial impetus in the development of the economy of the region, but highway transportation has become the principal factor in the present economy. It has permitted the rapid and easy movement of supplies to and produce from the farms and ranches. It has made possible the speedy movement of persons and property between communities and cities. It is reported that one person out of six makes his living in some activity related to highway transportation.

Since the highway between Livingston and Billings is heavily traveled and is the most important tourist highway in the State, a substantial amount of the commercial development of the area has been established to serve highway traffic and is dependent on the continued movement of this traffic through the region. Examples include service stations, hotels, motels, and eating places as the principal beneficiaries, but the benefits also extend to grocery stores, drug stores, souvenir shops and similar

establishments.

The present highway passes through the center of the following counties in the location between Livingston and Billings: Park, Sweet Grass, Stillwater, and Yellowstone. The following statistics are presented as an indication of the economy of these counties:

	Park	Sweet Grass	Stillwater	Yellowstone
POPULATION DATA				
1950 Census	11,999	3,621	5,416	55,875
1957 Estimate	12,900	3,100	5,600	75,700
1950 Density per Sq. Mile	4.6	2.0	3.0	21.2
Percent Urban in 1950	64.0	- -	- -	63.5
Percent Rural-Non Farm	16.5	53.7	50.7	24.0
Percent Rural-Farm	19.5	46.3	49.3	12.5
FARM DATA (1954)				
Total land area of county (sq. mi.)	2,627	1,846	1,797	2,635
Percent of land area in farms	50.2	69.7	77.1	98.5
Land in farms or ranches (acres)	844,000	824,000	886,000	1,661,000
Irrigated land in farms (acres)	56,000	46,000	31,000	90,000
Percent of farm land irrigated	6.6	5.5	3.5	5.4
Crop harvested (acres)	85,000	56,000	122,000	176,000
Land pastured (acres)	718,000	743,000	662,000	1,362,000
Average size of unit (acres)	1,535	2,250	1,378	1,186
Average value of land and buildings per acre	$31.23	$20.51	$27.31	$27.66
Livestock on farms (1957):				
Cattle	43,200	43,800	43,400	102,100
Sheep	36,600	59,900	31,100	19,300
Hogs	1,800	2,000	3,800	6,400
Farm receipts (1956):				
Crops	$1,179,000	$473,000	$2,687,000	$7,533,000
Livestock & products	3,231,000	3,617,000	3,474,000	7,001,000
Government payments	96,000	125,000	126,000	548,000
Total	$4,596,000	4,215,000	6,286.000	15,082,000
Average per farm	$7,816	$10,753	$9,124	$10,055
Number of farms & ranches	550	366	643	1,401

	Park	Sweet Grass	Stillwater	Yellowstone
MISCELLANEOUS DATA				
Agricultural labor force (1950)	949	746	1,089	2,358
Total labor force (1950)	4,673	1,495	2,006	21,402
Percent agricultural	20.3	49.8	54.2	11.0
Retail establishments (1954)	230	52	92	696
Sales in 1954	$13,934,000	$3,508,000	$4,774,000	$97,034,000
Service establishments (1954)	105	16	21	399
Receipts in 1954	$1,805,000	$255,000	$170,000	$10,921,000
Bank Deposits in 1956	$9,451,000	$3,224,000	$3,696,000	$90,880,000
Motor vehicle registrations (1958)				
Passenger cars	5,468	1,373	2,108	30,313
Trucks & buses	1,942	832	1,211	8,406
Total	7,410	2,205	3,319	38,723

DESCRIPTION OF COUNTIES AND CITIES

PARK COUNTY

Livestock raising is the principal industry of the county. Most of the agricultural activity is located in two large river valleys: the Shields River valley and the Yellowstone River valley. These are large valleys with a substantial amount of land which can be irrigated. A large part of the county consists of extensive and very scenic mountain ranges. The north entrance to Yellowstone Park is located at Gardiner at the south boundary of the county. There are large stands of timber of merchantable quality. Lumber production is an important industry.

The existence of the mountains, forests, large rivers, smaller mountain streams and the access to Yellowstone National Park all help to make Park County an important recreational area. Big game hunting is an important attraction near Gardiner.

Livingston is the county seat. This city had a population of 7,683 in 1950 or about 64% of the population of the entire county. It originally gained prominence as a division headquarters of the railroad. Since the use of diesel engines, its importance in this respect has decreased, but other activities have taken its place. Being the closest large city to the north entrance of Yellowstone National Park, it derives much of its revenue from the tourist industry and many of its facilities have been established to serve this trade. It has a well developed business district and serves a large trading area.

Livingston is located at the intersection of two important highways: U.S. Highway No. 10 and U.S. Highway No. 89.

Springdale (population 75) is the only other community located along the highway under consideration. This is a small social center with a nearby hot springs resort.

SWEET GRASS COUNTY

Livestock raising is also the principal industry of this county. The greatest development is in the Yellowstone River valley; however, there are some productive irrigated areas adjacent to other mountain streams in the county. The population of the county is estimated at 3,100 in 1957. There has been a steady decrease in population since 1920. The contributory factor appears to be the consolidation of ranches into larger units and the need for fewer farm laborers with the improvement in farm machinery.

A large part of this county consists of scenic mountain ranges with heavy forest cover. Hunting, fishing and other recreational activities are important. Chromium mining in the southern mountains represents an important potential activity.

Big Timber, the county seat, had a 1950 population of 1,679. This was equal to 46% of the total population of the county. Being a county seat, it has the usual facilities of a trading center. Many facilities are connected with service to highway traffic.

Greycliff is the only other community in this county which is located along the present highway. With a population of 85, it consists of a post office and a small cluster of service facilities and dwellings.

STILLWATER COUNTY

The principal industry of this county is also livestock raising. The main developments are located in the irrigated valleys of the Yellowstone and Stillwater Rivers. There is, however, a large area of dryland farming in the northern part of the county.

The estimated population of this county in 1957 was 5,600. This represents a reversal of the trend since 1920 of decreasing population. Part of the reversal may be attributed to increasing industrial activity in the vicinity of Columbus and the resumption of mining operations at the chromium deposits in the southern part of the county. These chromium deposits are reported to be the largest in the United States and were mined quite actively during the war when shipping disturbances prevented the importation of foreign chromium ore.

Columbus is the county seat of Stillwater County. With a population

of 1,097 in 1950, it had about 20% of the population of the county. It has a small but well developed business district with numerous establishments catering to the highway traffic.

The only other communities of interest along the highway include Reed Point and Park City. Reed Point has a population of 130, and there are 350 persons in Park City. The latter community is on the edge of the irrigated area west of Laurel, and this population figure includes residents of some of the adjacent homes.

YELLOWSTONE COUNTY

Towards the western edge of Yellowstone County, the river valley widens out into a plain which is irrigated and intensively cultivated. This section of the valley was one of the first to be irrigated under the Carey Act. The major irrigated area extends from a point near Park City to another point near Pompey's Pillar. The irrigation permits economical operation of smaller farm units with a consequent increase in the population density.

Unlike the other counties which have been described, Yellowstone County has an absence of mountainous terrain. As a result, most of the land is included in some type of productive enterprise.

The general economy of Yellowstone County and particularly the Billings-Laurel area is quite diversified. In addition to the diversity of farm and ranch operations, there are the usual commercial and industrial enterprises which are generally associated with the larger population centers. This leads to a balanced economy and one that has shown a rapid growth over the years.

Billings, the county seat was the second largest city in the State in the 1950 Census. At that time it had a population of 41,834. The population growth has continued since 1950, and it has been estimated that the 1957 population reached 42,000 exclusive of the environs. There is a substantial amount of fringe development around the city, and this has helped Yellowstone County achieve the position of the most populous county in the 1950 Census. The commercial and industrial enterprises are too numerous to mention, but the principal ones include a livestock sales yard, two large oil refineries and a sugar factory. The city is the principal trading center for the south central and southeastern region of the State.

Laurel is the second most important city in the county. It is located along the present highway and had a population of 3,663 in 1950. This city has also shown continued growth since 1950. Principal industries include an oil refinery, trucking headquarters, grain elevators and a large railroad switching and distribution yard.

Laurel is located at the junction of U.S. Highways No. 10, 12, and 310. U.S. Highway No. 310 is also designated as Route 789. U.S. Highway No. 12 serves as the approach road, via Beartooth Pass, to the northeast entrance of Yellowstone National Park. U.S. Highway No. 310 is also an important route serving tourist and other interstate traffic.

About 64% of the 1950 population of Yellowstone County was located in the cities of Billings and Laurel.

TRAFFIC SERVICE

The principal problem in connection with traffic assignment involves the determination of the amount of traffic, now using the present highway, that would divert to either the North Route or the North Alternate Route if the Interstate highway routing through this region were to be constructed on either of these lines.

The amount of traffic now using the present highway can readily be determined from the regular, continuing schedule of traffic counts taken at strategic points along this highway. The present traffic varies from 2,900 vehicles per day at a point at the east edge of Livingston to a low of 1,565 vehicles per day at a point east of Big Timber and increases steadily to a high of 10,760 vehicles per day at a point west of Billings. The average of the entire section from Livingston to Billings amounts to 2,033 vehicles per day. About 59% of this traffic consists of Montana passenger cars and light trucks; about 25% includes out-of-state passenger cars; and about 16% represents trucks heavier than panels and pickups.

The following table shows the average number of vehicles per day counted at various principal points:

Location	Vehicles Per Day
East of Livingston	2,900
West of Big Timber	1,472
East of Big Timber	1,565
East of Columbus	1,707
West of Laurel	2,510
East of Laurel	5,205
West of Billings	10,760
Average for section	2,033

The results of three traffic surveys were used in making an estimate of the number of vehicles that would divert from the present highway to either of the proposed lines on the north side of the Yellowstone River. In a survey made during the summer of 1954, 10,606 drivers were interviewed at a station on U.S. No. 10 just west of Billings. In the summer

of 1956, another survey interviewed 3,544 drivers at a point just east of Livingston on U.S. No. 10. After analyzing the results of these surveys, it was determined that about 700 vehicles per day reported trips with origins or destinations in Livingston and points beyond, or in Billings and points beyond. These trips would normally be considered as through trips between the two cities, but the questionnaire was faulty in that it did not determine if these trips also had intermediate stops between the two cities. In order to obtain this type of information, a special survey was made during the month of April 1959 at points east of Livingston, east and west of Big Timber, east and west of Columbus, and west of Laurel.

During this survey, interviews were obtained from 3,255 drivers who reported a total of 3,605 one-way trips, including some stops at intermediate points between Livingston and Billings. The results disclosed that 68% of the trips between the two cities traveled non-stop, and 32% of the trips had occasion to stop at some intermediate point in the travel between the two cities. The application of these percentages to the previously determined figure of 700 through trips per day from the Billings and Livingston surveys, resulted in a revised figure of 476 trips per day of actual through trips and 224 trips per day between the two cities that involved stops at intermediate points. It was realized that the April 1959 survey was made at a time when the tourist traffic was below normal, and since it is known that tourists make a greater proportion of long distance trips, it was believed that the percentage of 68% non-stop through trips was somewhat low.

A separate analysis of data obtained from the April 1959 survey disclosed that there were 528 non-stop trips per day between the two cities of Livingston and Billings. This higher figure was used in computing the traffic diversion to either of the alternate routes on the north side of the river. The figure of 528 through non-stop trips per day between the cities represents a figure which has been adjusted to the average daily traffic for an entire year, and it was increased from the seasonal data obtained during the April survey.

In addition to the 528 through trips between Billings and Livingston, there were other trips which could be assigned to either of the routes on the north side of the river. These included:

1. The trips between Livingston and U.S. No. 89 north of Mission Junction. If it is practicable to construct an interchange north of Livingston, it is believed that a part of the trips from Livingston north towards White Sulphur Springs would use the north Interstate routes as being more direct routes.

2. Trips from Livingston to Big Timber and Montana No. 19 north of Big Timber. Because of the advantage of traveling on an Interstate highway, it is believed that all of these trips could be assigned to the north routes.

3. Trips from Billings to Big Timber and Montana No. 19 north of Big Timber. There would be a substantial savings in travel distance via the north routes, so trips between these points were assigned to the north routes.

4. There were a small number of trips between Billings and U.S. No. 89 north of Mission Junction. These trips were also assigned to the north routes.

5. The North Route would provide little or no service to the city of Laurel. For this reason, no trips to and from Laurel were assigned to the North Route. The North Alternate Route, however, would provide a satisfactory connection to Laurel, so trips were assigned to this route between Laurel and Big Timber, Montana No. 19, U.S. No. 89 and Livingston. Trips from the highway to the south of Laurel were also included in the Laurel traffic assignment.

6. The proximity of the interchange on the north routes in the vicinity of Springdale would encourage a small amount of movement of interior trips to the north routes. These were also included in the assignment of traffic to the north routes.

These additional assignments of traffic increased the number of vehicles per day on the North Route by 139, making a total of 667 vehicles per day of traffic which could be expected to divert to this route. The total traffic on the North Alternate Route was increased by 210 vehicles per day, making a total of 738 vehicles per day of diverted traffic for this route. The North Alternate Route carries a greater volume of traffic than the North Route for the reason that it provides service to Laurel which is lacking on the North Route.

In addition to the diverted traffic, either of the north routes would serve a small amount of traffic of local origin along these routes. The greatest usage would be in the areas to the west of Billings and to the east of Livingston; however, there would be a small amount of traffic movement all along the north routes. The North Alternate Route would be of no service to the traffic from the Molt-Billings area, consequently, the local traffic from this area has been omitted in the traffic assignment computations.

Since separation structures would be required on the North Route at points of intersection with the Laurel-North and Columbus-North roads, the planning includes the addition of ramps so that these facilities can also serve as interchanges. However, the traffic analysis did not develop enough traffic movement to these cities to warrant the improvement of the connecting roads. If the improvement of the connecting roads was considered

desirable, it would appear that the construction would have to be financed out of the Secondary System construction funds allocated to Stillwater and Yellowstone Counties. Such connecting roads would not qualify for improvement with Interstate funds, and the non-availability of Primary System mileage and non-conformity with Primary System criteria would preclude the improvement of the roads with Primary System funds.

The final traffic assignment developed the following results:

Diverted from present highway to North Route	667 vehicles per day
Local traffic service on North Route	41 vehicles per day
Total estimated traffic on North Route	708 vehicles per day

Diverted from present highway to North Alternate Route	738 vehicles per day
Local traffic service on North Alternate Route	29 vehicles per day
Total estimated traffic on North Alternate Route	767 vehicles per day

The average daily traffic on the present highway now amounts to 2,033 vehicles per day. The diversion of 667 vehicles per day would leave 1,366 vehicles per day remaining on the present highway if the North Route were to be constructed.

If the North Alternate Route were to be constructed, the diversion of 738 vehicles per day to that route would leave 1,295 vehicles per day on the present highway.

It may be noted that, if either of the north routes were to be constructed, approximately two-thirds of the traffic would remain on the present highway, making it necessary that this highway be kept in first-class condition to serve this volume of traffic. The importance of maintaining service for the remaining traffic is evident since the remaining traffic volumes are about equal to the average for the Interstate System as a whole.

The reason that the traffic remaining on the present highway predominates over the diverted, through traffic on the north routes is evident when the economic factors are analyzed. As explained in the previous narrative, the economy of the entire region has developed and become established on the basis of the features involved in the river valley. The population and activities have concentrated in this area where there is abundant water for irrigation, domestic and industrial uses and good transportation facilities in the form of the railroad and the present highway.

The location of the highway at a considerable distance north of the river will be of benefit to the through traffic and the small amount of local residents in that vicinity, but it will not reduce the need for adequate highway facilities to serve the economy and the population

concentration in the river valley. The present transportation pattern involves the use of the existing highway as a trunk road collecting traffic from numerous intersecting roads and carrying it to the shopping, transportation and population centers which are located along the highway. Traffic counts are available at points where principal roads intersect the present highway. These counts show that 441 vehicles per day enter the highway between Livingston and Big Timber; from Big Timber to Laurel, 2,732 vehicles per day enter the highway; and from Laurel to Billings, the traffic increases from 5,000 vehicles per day to 11,000 vehicles per day as the result principally of traffic to and from intersecting roads.

The traffic on the north side of the river is predominantly a north-south movement from the farms and ranches to the trading centers and transportation facilities which are located along the river. The proposed routes on the north side of the river are located in an east-west direction or contrary to most of the existing traffic movement. The construction of an improved highway in this area will change the traffic pattern to some extent for the reason that people will be willing to travel greater distances to other shopping and population centers if a high standard highway is available in preference to the present unimproved roads in the region. It is doubtful, however, that any factors are present which would encourage the development of significant population or commercial centers along the north routes or the migration of population and facilities from the present highway to the new routes.

Another indication of the relative highway service of the north and south routes is revealed in a dwelling count in the vicinity of the highways. From Livingston to Big Timber, there are 60 houses and 15 businesses located in a band bordered by the river on the north and a line about two miles south of the present highway. From Big Timber to Laurel, there are 449 dwellings, 58 businesses and 10 schools, churches and halls in the width of the same band. These figures do not include dwellings, businesses or other establishments in the incorporated cities of Livingston, Big Timber, Columbus or Laurel.

Along the present highway, there are about 1,500 rural residents and about 3,400 residents in the cities and communities of Springdale, Big Timber, Greycliff, Reedpoint, Columbus and Park City.

On the north route, it is more difficult to define a band of influence along the proposed route, but it appears that there are about 120 dwellings within an area of two miles on each side of the proposed line between Livingston and an equivalent point opposite Laurel. These dwellings would contain about 400 persons. If it is assumed that the north routes would provide service to Big Timber and Springdale equal to the South Route, an additional 1,750 persons would be served.

These figures are presented to show that either of the north routes could not be considered as a replacement or a substitute for the existing

highway between Livingston and Billings. They also show that the traffic remaining on the existing highway would be about twice that which would divert to the north routes. For these reasons, any highway planning in this vicinity must take into consideration the fact that the residents and local traffic served by the present highway are entitled to consideration equal to that of through traffic in deriving the benefits from improved highway facilities.

DESCRIPTION OF ROUTES

NORTH ROUTE

The North Route begins at a point of common terminus with the South Route at a location about two miles west of Livingston on U.S. No. 10. The route extends in a northeasterly direction on an alignment along the north edge of the city which misses the new residential district in this vicinity. It crosses a ridge in this vicinity and then descends to the river valley. Approximately 600 feet of rise and fall are involved in the crossing of this ridge. It continues through the river valley to an intersection with U.S. Highway No. 89 along an alignment which parallels the old location of U.S. No. 89. This is an irrigated area but the new highway should be able to avoid most of the irrigated land.

A serious construction problem is encountered in the location east of U.S. No. 89. The Interstate Division selected a line that follows along the present road which is adjacent to the Yellowstone River. In this section, the Yellowstone River flows along high rock cliffs for a distance of about two miles. Construction of a highway adjacent to these cliffs would involve the removal of a substantial portion of the rock, with fill being extended into the river.

An alternate route, which was selected by the Programming Engineer, is located about one mile north and would climb over the ridge of which these cliffs are the extension. In doing so, the highway would rise about 800 feet above the water level route. Substantial rise and fall and steep grades would be involved in this routing.

The eastward extension of the North Route, as selected by the Interstate Division, would follow along the general line of the present county road to a point about eight miles southwest of Big Timber where this road ends. Beyond this point, the North Route would follow an undeveloped location across a series of hills embracing the drainage of Little Timber Creek. After crossing these hills, with a rise of about 150 feet, the route would continue to a junction with Montana Highway No. 19 about two miles north of Big Timber.

Throughout the area from U.S. No. 89 to Montana No. 19, the North Route would be located at the northern edge of most of the irrigated land in this area. Since it would be necessary to straighten and widen the existing county road, a certain amount of this irrigated land would be

required for right-of-way purposes. It would also be necessary to adjust some of the irrigation canals and ditches.

The alternate route, which was selected by the Programming Engineer, would be located about one mile north of the existing road. It would miss practically all of the irrigated land and irrigation facilities but it is through moderately rough terrain which would normally be avoided. In the vicinity of Little Timber Creek and east to Montana No. 19, this alternate route would practically coincide with the location selected by the Interstate Division.

From a point on Montana No. 19 east to Billings, the North Route of the Interstate Division would coincide quite closely with the routing selected by the Programming Engineer. Any differences occur at points where the Interstate Division routing deviates from a straight line to take advantage of the natural terrain features.

Eastward from a junction with Montana No. 19, the North Route begins a gradual ascent through land that is used mostly for grazing to a point on a small divide separating Big Timber Creek from Sweet Grass Creek. It crosses the Sweet Grass Creek drainage through irrigated bottom land and then begins a steady climb to cross a high ridge between Sweet Grass and White Beaver creeks. This section of highway involves a rise of about 900 feet in crossing this divide and similar fall into the White Beaver Creek drainage area. The west side of the divide will be quite steep with a substantial amount of rock excavation for about 2.5 miles. The slope on the east side is more gentle, and the excavation will not be quite so difficult.

In the White Beaver Creek drainage area, the highway crosses a relatively large and fairly well developed basin. There is a variety of irrigated, dry farming and grazing land in this basin. After leaving the basin, the route crosses rolling grazing and grain land to a point on FAS Route 306. This is an important secondary road between Rapelje and Columbus.

The routing east of the Rapelje road crosses an area which may be described as benchland with a few small hills. The rougher terrain on the hills is utilized for grazing and the level and more fertile land on the benches is devoted to grain farming. There is only a small amount of irrigated land through this region. The benchland continues to a point about 12 miles west of Billings where a descent is made into the Yellowstone River valley. From a point on the Rapelje road to the point of descent into the valley, the population is relatively sparse.

After reaching the valley floor, the route crosses an area of irrigated and cultivated land to a point where it approaches the rimrock area which defines the north boundary of the river valley. At this point, the proposed North Route begins to enter a rapidly developing residential area. In the expansion westward from Billings, a number of

expensive residences have been built up to the base of the rimrocks. There is no street or road system through this area that could be utilized in part for the new highway, so it will be necessary to locate the highway entirely through the series of residences. The problem exists of locating the highway as close as possible to the base of the rimrocks and thereby involving fewer residences but incurring more costly construction and the danger of falling rock, or moving the highway at a safe distance from the rimrocks where a larger number of houses would be involved.

The greater portion of the housing and the most expensive residences are located in the area beneath the rimrocks west of the junction with FAP Route 53 (North 27th Street)but the problem will exist throughout the entire section to the Fairgrounds at the east edge of Billings. In all, it is estimated that about 90 residences will be affected in addition to industrial property. Regardless of the exact location through this developed area, a serious problem exists in the acquisition of right-of-way and the disruption of the existing development.

An interchange to serve the central part of Billings is planned at the intersection with North 27th Street. This location at the base of the rimrocks will create a problem in design and the acquisition of adequate ground to permit the construction of the necessary ramps.

Another interchange is planned at the intersection with present U.S. No. 10 in the vicinity of the fairgrounds. There may also be a problem at this point of obtaining the necessary space for an interchange. The route then crosses the Yellowstone River and ends at a point of common terminus with the South Route at a point east of the present bridge on U.S. No. 87.

The total length of the route is estimated at 110.0 miles, including 29.5 miles of four lane construction. The major part of this four lane construction is required, not for the service of large traffic volumes, but to permit the free movement of traffic on grades where truck speeds would be reduced.

In general, the North Route could be described as being located through an area where there would be a minimum of disruption of irrigated land and farm and ranch development. In order to achieve this objective, it has been necessary to move the highway to rougher and more sparsely developed terrain. In such a location, the highway would be of minor benefit to local traffic, but it would provide a much shorter travel distance for through traffic between principal cities such as Billings and Livingston.

The location of the highway through rougher terrain involves the construction of a substantial amount of four-lane mileage because of excessive grades. Such terrain also involves a significant amount of rise and fall with a consequent loss in operating efficiency of the motor

vehicles.

A very serious problem exists in connection with the approach and service to the city of Billings. The proposed location at the base of the rimrocks will involve the obliteration of the residences through this area. There is also a problem of falling rock in this vicinity.

Throughout the greater part of this route, natural gravel deposits are absent. It may be possible to utilize some of the rock outcroppings as material for base courses, but it appears that it will be necessary to haul most of the surfacing material from gravel deposits in the valley of the Yellowstone River. This will be a costly process.

SOUTH ROUTE

This route was selected in conjunction with the Section 108 (d) Study which was required as part of the Federal Aid Highway Act of 1956.

The route begins at a common terminus with the North Route at a point west of Livingston on U.S. No. 10. In order to avoid the developed portion of the city, it is located in a semi-circular manner around the south edge of the city and on the south side of the Yellowstone River. An interchange is planned at the junction with U.S. No. 89 leading to Gardiner and Yellowstone Park.

The location selected in bypassing the city avoids most of the suburban portion of the city,but it involves the crossing of a small amount of well developed farm land. On the far side of the river, the route climbs upon a bench for a short distance and then descends to a point on present U.S. No. 10.

From this point to Big Timber, it follows quite closely the location of the existing highway. A construction problem exists at the point where it was necessary to remove a large rock cliff in the vicinity of Springdale in order to obtain the required width for the new highway. Only a small amount of irrigated land is affected between Livingston and Big Timber on the proposed south line.

In the vicinity of Big Timber, it is necessary to move the new highway to the south in order to miss the developed portion of the city. After this short deviation, the route returns to the location of the present highway and follows this line quite closely until Greycliff is reached. At Greycliff, a short relocation is necessary in order to miss the community. Between Big Timber and Greycliff, the proposed route crosses land that is about equally divided between irrigation and grazing.

Beyond Greycliff, the South Route continues to follow the present highway with minor straightening. Most of the land to Reedpoint is under cultivation and is irrigated. At Reedpoint, the highway deviates to the

south to miss the community and then returns to the present location until the Yellowstone River crossing is reached. A new bridge site has been selected in this area which involves a short relocation of the highway.

Beyond the river crossing, the South Route returns to the present line and continues with minor realignment to a point west of Columbus. Through this section, the land is predominantly irrigated. As Columbus is approached, the proposed highway veers to the north of the city and it continues on a new line for a distance of about 12 miles. On this alignment, the highway crosses hilly grazing land and misses most of the irrigated land which is located near the river.

At a point about 12 miles east of Columbus, the South Route joins the present highway and continues to follow the line with minor corrections to a point near Park City. Both irrigated and grazing land are encountered in this section. At a point a few miles west of Park City, the river valley begins to widen into the Billings valley. This is the beginning of a large, fertile and well developed irrigated area extending from the Park City region on the west to the Pompey's Pillar region on the east.

From Park City east the route is located on a new line north of the railroad to a point of crossing about 2 miles west of Laurel, then on a location approximately one-half mile south of the railroad to a point near Mossmain. At this point, the new highway rejoins the location of the present highway and follows it to a point about 1.5 miles west of Billings. It then veers to the south in order to miss most of the suburban portion of the city and continues in a northeasterly direction across the Yellowstone River to the point of common terminus with the North Route.

Between Mossmain and the interchange west of Billings, there is a substantial amount of commercial development which must be purchased or moved to make room for the four-lane facility which is required to serve the large volumes of traffic in this region. It will also be necessary to construct frontage roads on both sides of the new highway to carry the substantial volumes of traffic which will not be able to enter the highway between interchanges

At the point where the new highway veers to the southwest of Billings, it will be necessary to locate through a drive-in theater. As the highway passes beyond this point it will be located through a developed residential district and about 15 houses will have to be purchased or moved.

The length of the South Route is estimated at 124.5 miles, involving 54.7 miles of four-lane highway. The majority of the four lane highway is required in the vicinity of Livingston and in the area between Park City and the eastern terminus to accommodate the traffic volumes to be served.

Short sections of four-lane highway will be required at other points where the terrain involves steep grades which will slow truck traffic.

Briefly stated, the South Route represents an attempt to locate the new highway in close proximity to the present highway where it will provide the best service to the numerous cities, communities and local residents located in the Yellowstone River valley. The proposed location utilizes the right-of-way of the present highway insofar as possible in order to minimize the damage to adjacent farms and ranches. Where deviations from the present highway are necessary, varying damage will occur. In some instances, the relocation will involve grazing or other land of low productivity; in other cases, valuable farm or commercial land will be involved.

Since a large part of the highway is located through areas that are irrigated, the soil conditions may require that substantial thickness of base material be used in the construction. This route, has the advantage, however, that adequate gravel deposits are located within the immediate vicinity.

Since this route is located in the river valley for most of its length, it has the advantage of a water level grade. Its location on the river plain eliminates the need for crossing intersecting streams at higher ground where the terrain is rougher.

NORTH ALTERNATE ROUTE

This route follows the North Route from the point of beginning west of Livingston to a point about 8.5 miles east of the intersection with the Columbus-Rapelje Road. At this point, the proposed alternate leaves the north line and follows a drainage course in a southeasterly direction to a point east of Laurel where it joins the alignment of the South Route and follows the South Route location to the eastern terminus.

This alternate location has the advantage that it would eliminate the troublesome situation on the North Route of traversing Billings through the expensive and extensive residential area at the foot of the rimrocks.

It is generally agreed that new four-lane highway construction will be needed from Laurel to Billings, regardless of the Interstate routing chosen. The North Alternate Route, by serving the Laurel-Billings traffic would eliminate the need for two separate highways to the west of Billings.

Since the remainder of the North Alternate Route has been described under the headings for the North Route and the South Route, this material will not be repeated in this section.

The length of this route is 114.8 miles and includes 37.8 miles of four lane highway.

HIGHWAY TRANSPORTATION COSTS

Highway transportation involves two principal and separate types of costs. One type of cost is concerned with the construction and maintenance of the necessary facilities to serve the movement of motor vehicles. The other type of cost involves the purchase, maintenance and operation of the vehicles using the highway facilities.

Money for the construction on the State highway systems comes almost exclusively from taxes paid by the highway users. Federal Aid is derived from Federal automotive excise taxes paid into the Federal Highway Trust Fund. State money is derived from the State Highway Fund which consists almost entirely of the receipts from the State Motor Fuel Tax and the State Gross Vehicle Weight Tax.

The State Highway Commission is responsible for the maintenance of the Interstate and Primary systems, and any money for this purpose also comes from the State Highway Fund. Maintenance of the Secondary System is the responsibility of the county, but a large part of the money spent for maintenance purposes comes from the license plate fees which are a highway user tax.

It is evident, therefore, that the highway user has a vital interest in the expenditure of these funds in a manner which will be most economical and beneficial. In determining how these funds shall be spent in the best interests of all concerned, consideration must be given to vehicular operating costs as well as the costs of constructing and maintaining the highway facilities. Also the situation must be analyzed in light of the transportation needs of the general area rather than those of one particular highway.

It would be possible to select a highway routing that would be most economical from the standpoint of construction and maintenance costs; however, unless this highway was located so that it would serve the transportation needs, it would be of little value to the highway user who would be paying for the facility. Likewise, it is possible that a highway, which would serve the traffic in the best and most direct manner, would have to be located through the center of the more highly developed areas with a detrimental result to the economy of the area. This latter feature would apply especially to Interstate highways with their access control features.

In the final analysis, the selection of the most favorable proposal would involve consideration of all features involved, including construction costs, maintenance costs, vehicular operating costs, damage to property and the economy of the area, and service to the transportation

needs of the general area.

CONSTRUCTION AND MAINTENANCE COSTS

The Interstate Division has made estimates of the construction costs applying to each of the routes. The estimates for the North Route and the North Alternate Route have been prepared on the basis of inspection of aerial photography, contour maps and reconnaissance surveys made in the field. The estimates for the South Route are based mainly on the results of the computations for the Section 108 (d) Study, with appropriate adjustments being made for differences between original estimates and actual contract amounts as derived from those projects which have been contracted to date.

Detailed construction cost computations are shown in tables and plates in the appendix of this report. In the interest of brevity, only the principal features are included in this section of the report.

Total construction costs are of considerable interest in a comparison of routes; however, a better comparison can be made by reducing the total costs to annual costs on the basis of estimated service lives assigned to the different items. The total and annual costs for each route are shown below:

CONSTRUCTION ITEMS	EST. YEARS OF LIFE	ESTIMATED TOTAL COSTS NORTH	NORTH ALT.	SOUTH
Structures	50	$ 7,540,000	$ 6,824,000	$10,398,000
Right-of-Way	50	2,861,000	5,582,000	7,533,000
Surface	20	3,670,000	4,197,000	5,182,000
Other	40	23,822,000	25,366,000	26,704,000
TOTAL		$37,893,000	$41,969,000	$49,817,000
LENGTH IN MILES		110.0	114.8	124.5
COST PER MILE		$ 344,482	$ 365,584	$ 400,136

CONSTRUCTION ITEMS	EST. YEARS OF LIFE	ESTIMATED ANNUAL COSTS NORTH	NORTH ALT.	SOUTH
Structures	50	$ 150,800	$ 136,480	$ 207,960
Right-of-way	50	57,220	111,640	150,660
Surface	20	183,500	209,850	259,100
Other	40	595,550	634,150	667,600
TOTAL		$ 987,070	$1,092,120	$1,285,320
LENGTH IN MILES		110.0	114.8	124.5
COST PER MILE		$ 8,973	$ 9,513	$ 10,324

Maintenance costs have been computed on the basis of $1,500 per mile per year for a two-lane highway, $2,500 per mile per year for a four lane highway, and $1,000 per mile for frontage roads. These computations are shown below.

	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Miles of two-lane highway	80.5	77.0	69.8
Annual maintenance cost	$120,750	$115,500	$104,700
Miles of four-lane highway	29.5	37.8	54.7
Annual maintenance cost	$ 73,750	$ 94,500	$136,750
Miles of frontage road	5.0	25.0	60.0
Annual maintenance cost	$ 5,000	$ 25,000	$ 60,000
TOTAL ANNUAL MAINTENANCE COST	$199,500	$235,000	$301,450

The following presents a comparison of the combined annual construction and maintenance costs for each route:

	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
ANNUAL CONSTRUCTION COSTS	$ 987,070	$1,092,120	$1,285,320
ANNUAL MAINTENANCE COSTS	199,500	235,000	301,450
TOTAL ANNUAL COSTS	$1,186,570	$1,327,120	$1,586,770

The North Route would be the most favorable from the standpoint of constructing and maintaining an Interstate System highway between Livingston and Billings. The annual cost of this routing would be $400,200 cheaper than the South Route and $140,550 cheaper than the North Alternate Route. The annual costs on the North Route would be 75% of similar costs on the South Route and 89% of the similar costs on the North Alternate Route.

As stated under the section on TRAFFIC SERVICE, it could be expected that about one-third of the traffic on the present highway would divert to either the North Route or the North Alternate Route if the Interstate highway were to be built on these northside locations. This would leave about two-thirds of the traffic remaining on the present highway.

The traffic remaining on the present highway is also entitled to equal consideration in receiving the benefits which improved highway facilities provide. The existing highway between Livingston and Billings has been in service many years and has reached the stage where deterioration and obsolescence require that the highway be reconstructed. A short section of this highway has been in service since 1923; at the other extreme, there is a section west of Springdale which is now under construction to Interstate System standards. The average age of the entire section is 25 years, with the majority of construction being about 30 years old. Highways of this age are not considered adequate to serve present traffic composed of modern vehicles.

Right-of-way widths range from 60 feet up to 220 feet. The average width of right-of-way amounts to about 95 feet.

Although it would be possible to stretch out the service of these highways for a few more years, an impartial analysis of the situation would require that the cost of reconstructing the present highway be included as a legitimate charge along with the Interstate costs for the North Route and the North Alternate Route in an appraisal of the overall transportation problem in this region. Since the section of highway from Big Timber west to Springdale has recently been constructed to adequate standards and the new Interstate section west of Springdale is under construction, these two sections of highway are omitted from the costs of reconstruction mentioned above.

This contingent construction for the North Route would involve reconstruction of the present highway between Livingston and Laurel to current Primary System standards, reconstruction of the Laurel-Billings section to four-lane Primary System standards, and reconstruction of North 27th Street in Billings to provide for the additional traffic which would be routed over this street into the business district from the interchange on the North Route.

Since the reconstruction of the Laurel-Billings section was included as part of the Interstate System costs for the South Route and the North

Alternate Route, these costs are not included as contingent construction for either of these routes. It would be necessary, however, to include as part of these routes, the cost of reconstructing South 27th Street to serve the traffic from the south interchange into the business district.

There are two highway facilities which are badly needed to improve the highway transportation situation in Billings, regardless of the Interstate highway routing which is selected. These are:

1. The construction of some type of railroad separation structure in the central part of Billings to correct the problem which now exists in crossing from the north side of the city to the south side in the vicinity of the central business district.

2. The construction of some type of railroad separation structure and approaches at the west of Billings where traffic enters the city from the present highway. An overpass is presently under contract at this point.

Both of these facilities are required to serve the present urban traffic which is principally of local origin. The location of the Interstate highway would not have an appreciable effect on either of these facilities, so it would be logical to charge them to all Interstate routings or to omit them from the calculations entirely. For the purpose of this report, they are being charged to the construction costs for each route.

The following shows the application of these charges for contingent construction against the three Interstate route proposals:

	NORTH ROUTE	NORTH ALTERNATE ROUTE	SOUTH ROUTE
Reconstruction of present highway from Livingston to Laurel to current Primary standards	$ 7,600,000	$ 7,600,000	Not Applicable
Reconstruct Laurel-Billings section to current Primary four-lane standards	$ 5,333,000	Not Applicable	Not Applicable
North 27th Street connection	300,000	Not Applicable	Not Applicable
South 27th Street connection	Not Applicable	400,000	400,000
Central railroad separation	1,700,000	1,700,000	1,700,000
West Billings separation and approaches	3,117,000	3,117,000	3,117,000
TOTAL CONTINGENT CONSTRUCTION	$18,050,000	$12,817,000	$5,217,000

NORTH ROUTE

	Primary Highway	North 27th Street	Central Railroad Separation	West Billings Connection	Total Costs	Est. Serice Life	Annual Cost
Structures	$ 1,500,000	$	$ 900,000	$1,775,000	$ 4,175,000	40	$104,375
Right-of-way	2,000,000		500,000	767,000	3,267,000	40	81,675
Surfacing	2,400,000	200,000	200,000	300,000	3,100,000	15	206,667
Other	7,033,000	100,000	100,000	275,000	7,508,000	30	250,267
TOTAL	$12,933,000	$ 300,000	$1,700,000	$3,117,000	$18,050,000		$642,984

NORTH ALTERNATE ROUTE

	Primary Highway	South 27th Street	Central Railroad Separation	West Billings Connection	Total Costs	Est. Service Life	Annual Cost
Structures	$ 881,465		$ 900,000	$1,775,000	$ 3,556,465	40	$ 88,912
Right-of-way	1,175,300		500,000	767,000	2,442,300	40	61,058
Surfacing	1,410,310	250,000	200,000	300,000	2,160,310	15	144,021
Other	4,132,925	150,000	100,000	275,000	4,657,925	30	155,264
TOTAL	$ 7,600,000	$400,000	$1,700,000	$3,117,000	$12,817,000		$449,255

SOUTH ROUTE

	Primary Highway	South 27th Street	Central Railroad Separation	West Billings Connection	Total Costs	Est. Service Life	Annual Cost
Structures		$	$ 900,000	$1,775,000	$ 2,675,000	40	$ 66,875
Right-of-way			500,000	767,000	1,267,000	40	31,675
Surfacing		250,000	200,000	300,000	750,000	15	50,000
Other		150,000	100,000	275,000	525,000	30	17,500
TOTAL		$400,000	$1,700,000	$3,117,000	$ 5,217,000		$166,050

The foregoing table shows the results obtained when those total costs are reduced to an annual basis.

Maintenance costs on these facilities must also be charged against the respective Interstate routing proposals. The computations have produced the following results:

	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Livingston to Laurel Primary - 2 lane	$ 135,000	$ 135,000	$ - - -
Laurel to Billings Primary - 4 lane	24,000	- - -	- - -
Other facilities	8,500	8,500	8,500
Total Annual Maintenance Cost	$ 167,500	$ 143,500	$ 8,500

The total annual cost of contingent construction and maintenance amounts to:

	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Annual construction costs	$ 642,984	$ 449,255	$ 166,050
Annual maintenance costs	167,500	143,500	8,500
GRAND TOTAL COST FOR CONTINGENT FACILITIES	$ 810,484	$ 592,755	$ 174,550

The combination of costs for the Interstate highways with the costs for contingent facilities for each route results in the following total of all construction and maintenance cost per year for each route proposal:

	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Interstate Highway Costs	$1,186,570	$1,327,120	$1,586,770
Contingent Facility Costs	810,484	592,755	174,550
GRAND TOTAL OF ALL ANNUAL COSTS FOR ALL FACILITIES	$1,997,054	$1,919,875	$1,761,320

When the costs for construction and maintenance are taken into consideration for both the Interstate highways and the related contingent facilities, it is found that the South Route proposal has the most favorable rating. It would be $235,734 per year cheaper than the North

Route and $158,555 per year cheaper than the North Alternate Route. The costs for the South Route proposal would be equal to about 88% of similar costs for the North Route proposal and 92% of similar costs for the North Alternate Route proposal.

Another matter, which is of primary importance in this state is the proportion of Federal and State funds involved in the construction and maintenance of these highways. During the postwar period, the State of Montana has been unable to obtain sufficient State revenue to permit the prompt matching of Federal Aid that has been apportioned to the State. Because of this shortage of State money, it is important that these highway proposals be reviewed in the light of the amount of State money involved in the transactions.

The Federal government has a transcending interest in the construction of the Interstate System because of its importance in the movement of nationwide traffic and also because of the defense aspects of the system. The national importance of the system is reflected in a higher proportion of Federal Aid which is applicable to construction costs. The matching ratio for the Interstate System is 91.30% Federal money and 8.70% State money. For the Primary, Secondary and Urban construction, the matching ratio is 56.49% Federal money and 43.51% State money. The Federal government does not participate in maintenance costs, so these costs become the sole obligation of the State for the Interstate and Primary systems.

The following shows the amount of State money involved per year in construction and maintenance of the highway systems under the three route proposals:

	NORTH ROUTE		NORTH ALT. ROUTE		SOUTH ROUTE	
CONSTRUCTION	FEDERAL	STATE	FEDERAL	STATE	FEDERAL	STATE
Interstate (91.30% Federal 8.70% State)	$901,195	$85,875	$ 997,106	$ 95,014	$1,173,497	$111,823
Primary (56.49% Federal 43.51% State)	272,244	209,689	159,983	123,223	- - -	- - -
Contingent (56.49% Federal 43.51% State)	90,978	70,073	93,802	72,248	93,802	72,248
TOTAL COSTS	$1,264,417	$365,637	$1,250,891	$ 290,485	$1,267,749	$184,071
MAINTENANCE						
Interstate (All State)		$199,500		$ 235,000		$301,450
Primary (All State)		159,000		135,000		- - -

	NORTH ROUTE		NORTH ALT. ROUTE		SOUTH ROUTE	
	FEDERAL	STATE	FEDERAL	STATE	FEDERAL	STATE
Contingent (All State)		8,500		8,500		8,500
TOTAL COSTS		$367,000		$378,500		$309,950
TOTAL OF ALL COSTS	$1,264,417	$732,637	$1,250,891	$668,985	$1,267,749	$494,021
ANNUAL SAVINGS OF STATE FUNDS IN FAVOR OF SOUTH ROUTE		$238,616		$174,964		- - -

These computations show, as an item of special interest to the State taxpayer, that the South Route would require $238,616 per year less State Highway funds as compared to the North Route and $174,964 per year less as compared with the North Alternate Route.

VEHICULAR OPERATING COSTS

The second principal consideration in an economic analysis of this type is the determination of the operating costs which would be incurred by the motorists in traveling on the highways involved in the different routing proposals.

The procedure involves the computation of the annual vehicle miles of travel on each type of highway under each Interstate routing proposal and then the multiplication of these vehicle miles of travel by unit costs per mile of travel as governed by the degree of improvement on the highway on which the travel is performed.

The unit costs are based on figures which have been recommended in a publication of the American Association of State Highway Officials for analyses of this type. Since the AASHO report was issued in 1952, it is necessary to increase the basic figures to compensate for the inflation which has occurred since that time.

In addition to the direct operating costs for fuel, motor oil, tires and maintenance and repairs, the recommended costs include allowances for depreciation, time savings, and the value of comfort and convenience inherent in highway improvement. The following unit figures were used in computing the travel costs involved in the various proposals:

	COST PER VEHICLE MILE OF TRAVEL		
	Passenger Cars	Trucks	All Vehicles
On New Interstate Highway	$.0925	$.2920	$.1243
On New Primary Highway	$.1040	$.3290	$.1401
On Existing Primary Highway	$.1105	$.3473	$.1483
On Existing County Roads	$.1409	$.4428	$.1704

The computations for the vehicle miles of travel on each type of highway are shown below:

	AVERAGE DAILY TRAFFIC	ANNUAL TRAFFIC	TRAVEL DISTANCE	ANNUAL VEHICLE MILES	COST PER VEH. MILE	TOTAL ANNUAL COST
UNDER PRESENT CONDITIONS						
Existing Primary Highway	2,033	742,045	124.5	92,384,603	$.1483	$13,700,636
Existing County Roads	41	14,965	130.0	1,945,450	.1704	331,505
TOTAL PRESENT CONDITIONS				94,330,053	$.1488	$14,032,141
UNDER NEW CONDITIONS						
NORTH ROUTE						
New Interstate Highway from Livingston to Billings	708	258,420	110.0	28,426,200	$.1243	$ 3,533,377
New Primary Highway from Livingston to Billings	1,366	498,590	124.5	62,074,455	.1401	8,696,631
TOTAL NORTH ROUTE				90,500,655	$.1351	$12,230,008
NORTH ALTERNATE ROUTE						
New Interstate Highway from Livingston to Laurel	767	279,955	98.3	27,519,577	$.1243	$3,420,683
New Interstate Highway from Laurel to Billings	5,785	2,111,525	16.5	34,840,163	.1243	4,330,632
Subtotal-Interstate				62,359,740	$.1243	$7,751,315

	AVERAGE DAILY TRAFFIC	ANNUAL TRAFFIC	TRAVEL DISTANCE	ANNUAL VEHICLE MILES	COST PER VEH. MILE	TOTAL ANNUAL COST
NORTH ALTERNATE ROUTE CONTINUED						
New Primary Highway from Livingston to Laurel	794	289,810	108.0	31,299,480	.1401	$ 4,385,057
Existing County Roads	22	8,030	32.0	256,960	.1704	43,786
TOTAL NORTH ALTERNATE ROUTE				93,916,180	$.1297	$12,180,158
SOUTH ROUTE						
New Interstate Highway from Livingston to Billings	2,033	742,045	124.5	92,384,603	$.1243	$11,483,406
Existing County Roads	41	14,965	130.0	1,945,450	.1704	331,505
TOTAL SOUTH ROUTE				94,330,053	$.1253	$11,814,911

SUMMARY

The following summarizes the results obtained from an analysis of the construction, maintenance and vehicular operating costs in connection with the alternate route proposals:

	COMPARISON OF ANNUAL COSTS		
	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Interstate construction	$ 987,070	$ 1,092,120	$ 1,285,320
Primary construction	481,933	283,206	- - -
Contingent construction	161,051	166,050	166,050
Total construction	$ 1,630,054	$ 1,541,376	$ 1,451,370
Interstate maintenance	$ 199,500	$ 235,000	$ 301,450
Primary maintenance	167,500	135,000	- - -
Contingent maintenance	8,500	8,500	8,500
Total maintenance	$ 375,500	$ 378,500	$ 309,950
Interstate operating costs	$ 3,533,377	$ 7,751,315	$11,483,406
Primary operating costs	8,696,631	4,385,057	- - -
Other operating costs	- - -	43,786	331,505
Total operating costs	$12,230,008	$12,180,158	$11,814,911
GRAND TOTAL-ALL COSTS	$14,235,562	$14,100,034	$13,576,231

	COMPARISON OF ANNUAL COSTS		
	NORTH ROUTE	NORTH ALT. ROUTE	SOUTH ROUTE
Annual savings in favor of South Route	659,331	523,803	
Total savings over 40 year life	$26,373,240	$20,952,120	

The computations of annual operating costs show that the estimated cost of traveling on the present facilities amounts to $14,032,141. Travel costs on the new and improved facilities amount to $12,230,008 per year for the North Route proposal, $12,180,158 for the North Alternate Route and $11,814,911 for the South Route. When the operating costs on the new facilities are deducted from those of the present facilities, savings are derived which amount to $1,802,133 per year for the North Route, $1,851,983 per year for the North Alternate Route and $2,217,230 for the South Route.

On the basis of the estimated traffic increase in the region during the estimated service life of 40 years, these savings could be expected to double. The savings would then amount to $3,604,266 for the North Route, $3,703,966 for the North Alternate Route and $4,434,460 for the South Route. When these annual figures are divided by the annual cost figures, the following benefit cost ratios are obtained:

	Annual Benefits		Annual Costs	Ratio
North Route	$ 3,604,266	÷	$2,005,554	1.7971
North Alternate Route	$ 3,703,966	÷	$1,919,876	1.9293
South Route	$ 4,434,460	÷	$1,761,320	2.5177

Stated in simpler terms, $1.00 spent in constructing and maintaining the North Route would produce savings of $1.80 during the estimated lifetime of the new construction. Similarly, $1.00 spent on the North Alternate Route would save the highway users $1.93 and $1.00 spent on the South Route would save the highway users $2.52 during the life of the construction.

CONCLUSIONS

The results of this analysis show that, when the Interstate highway alone is considered, the North Route would be the cheapest to construct and maintain, followed by the North Alternate Route and the South Route in that order. The Interstate routing, however, is only one consideration in the overall transportation situation in this region.

The traffic figures reveal that about one-third of the existing traffic on U.S. No. 10 could be expected to use the Interstate routings on the north side of the river. The remaining two-thirds of the traffic, which would remain on the present highway, is also entitled to equal consideration in participating in the benefits that result from highway improvement. The present highway from Big Timber to Billings is about 25 years old on the average and is inadequate in relation to present standards. If the Interstate highway were to be built on the north side of the river, it would also be necessary to reconstruct the present highway on the south side of the river. These costs of constructing and maintaining the present highway should be included as a charge against the routes on the north side of the river. When these charges are so included, it is found that the cheapest proposal would involve constructing the Interstate highway on the south side of the river where it will serve both the local and through traffic, thereby eliminating the need for constructing and maintaining two separate highway systems to serve the region.

When the routing proposals are analyzed from the standpoint of service to traffic, it is also found that the location of the Interstate highway on the south side of the river would be of greatest benefit to the traffic in the region. Either of the routes on the north side of the river would provide substantial distance savings for the through traffic that would use these routes. Such traffic, however, amounts to about one-third of the total, and the remaining two-thirds of the traffic, which would remain on the south side of the river, would not be able to enjoy the benefits which result from the use of the high-standard Interstate System facilities. The advantages to the Interstate System traffic on the north side of the river would be outweighed by the lack of these advantages to the traffic remaining on the south side of the river.

The analysis shows that the South Route would be most favorable from the standpoint of all three costs; construction, maintenance and vehicle operation. The total savings in favor of the South Route would amount to $659,331 per year in comparison with the North Route and $523,803 per year in comparison with the North Alternate Route. If a service life of 40 years is accepted for the highway construction, the total savings in favor of the South Route would be at least $21,000,000 during this period.

When the construction and maintenance costs are compared with the value of savings to traffic, all routes show a favorable benefit-cost ratio. The North Route has a benefit-cost ratio of 1.7971, the North Alternate Route has a ratio of 1.9293, and the South Route has a ratio of 2.5177. The benefit cost ratio on the South Route exceeds that of the North Route by 40% and that of the North Alternate Route by 30%.

On the basis of the economic data developed in this analysis, it must be concluded that the South Route location for the Interstate highway will provide the greatest benefit to the highway user.

One of the principal objections to this location along the alignment of the present highway is that the additional right-of-way required would damage severely many of the farms and ranches in the valley. It should be considered, however, that the reconstruction of this highway to Primary System standards, which would be required if the Interstate highway were to be located on the north side of the river, would also require a substantial amount of additional right-of-way. The average width of the present right-of-way through the valley amounts to about 95 feet. Current standards call for 160 feet of right-of-way for a two-lane Primary System highway, and in the area between Laurel and Billings, where a four-lane Primary highway would be needed, the right-of-way requirements would probably come close to those of an Interstate highway. New right-of-way would also be required where the present highway must be straightened to meet Primary standards.

It is difficult to place a value on the damage that an Interstate highway might cause to farm operations, but it is the practice to compensate land owners fully for damages which occur above the cost of the actual land involved. It is realized that irrigated land cannot be replaced in many instances; and, the estimates of the Interstate Division disclose that 1,130 acreas of such land would be required on the South Route. There are 223,000 acres of irrigated land in the counties through which the highway is located, so the 1,130 acres of irrigated land required for right-of-way purposes would amount to about one-half of one percent of the irrigated land in these counties. Also, the estimates show that 270 acres of irrigated land would be required on the North Route and 670 acres would be required on the North Alternate Route.

Insofar as dwellings and other buildings are concerned, it is evident that the damage to these facilities on the North Route would exceed those on the South Route. It is estimated that about 90 residences would be in the line of the highway on the North Route in the rimrock area of Billings. There will also be a few industrial establishments involved on the North Route in the rimrock area east of North 27th Street. In addition, it is estimated that the remainder of the North Route from Billings to Livingston will involve about 15 other dwellings. It appears that about 115 dwellings or other buildings will be involved in the Interstate highway routing on the North Line.

The number of buildings affected on the North Alternate Route would be considerably less because this line would miss the developed rimrock area at Billings. This line would probably affect about 35 buildings, with the majority being in the Laurel-Billings area.

The South Route would affect about 25 buildings in the Laurel-Billings area. Other buildings would be affected in the vicinity of Livingston, Big Timber, Greycliff, Reedpoint and Park City where the highway would have to be relocated around these places. Some farm buildings would also be affected along this line. In total, it appears that about 75 buildings would be affected on the South Route.

The foregoing figures apply to the Interstate highway locations, but it should also be considered that there will be a proportionate amount of damage incurred in the reconstruction of the present highway to new Primary System standards if the Interstate highway is located on either of the locations north of the river. This damage must be added to that involved in the Interstate highway locations north of the river.

The actual amount of damage to land and buildings is difficult to define for the reason that accurate knowledge will not be available until such time as the final location surveys have been made and the true damage can be appraised.

In the broadest aspects, the decision must be made concerning the feasibility of constructing and maintaining two separate highways to serve the traffic between Livingston and Billings, with one highway providing a shorter and more direct route for through traffic and the other highway being necessary to serve the populated areas and traffic volumes amounting to about twice those of the through traffic. In the more populous states where traffic is much greater than in Montana, such action appears to be feasible as evidenced by the operation of separate toll roads and freeways. In this state, there is neither the traffic or the State money available to justify the construction and maintenance of two highways when one will provide the required service.

The benefits of the South Route proposal occur principally because the Interstate routing in proximity to the present highway would serve 98% of the overall traffic involved in the highway transportation problem of the area. The Interstate routing on the North Route would serve 32% of the overall travel and the Interstate routing on the North Alternate Route would serve 66% of the overall travel.

Of particular interest to the State highway user and taxpayer, is the fact that the reconstruction of the present highway as part of the Interstate System would require that the State provide only 8.70% of the construction costs, whereas the reconstruction of the existing highway with Primary System funds would involve State participation at the rate of 43.51% of the construction funds. This feature alone reduces by approximately $7,000,000 the amount required from State Highway Funds during the 40 year period when all contingent construction and maintenance costs are taken into consideration.

The service to the cities of Livingston and Billings for each alternate route is also worthy of consideration. Origin-destination surveys, which have been made at these cities, provide information concerning the points of origin or destination for trips to and from the city. By tracing these trips and measuring the travel distances involved to the Interstate highway connection, it is possible to compute the amount of travel cost which would be incurred under the different proposals.

These computations for Livingston show that the South Route would save the motorists about $47,000 per year. These savings occur principally because the greater part of the trip origins and destinations are located in the section of the city which is closest to the South Route. The railroad tracks through the city are located at about an equal distance from the two routes and represent the approximate division line of influence between the two routes. The origin-destination survey discloses that 7% of the trips started or ended in the section of the city north of the railroad tracks, and the remaining 93% of the trips were located in the area to the south of the tracks.

The difference for the city of Billings is not so great. Computations show that the South Route (or the North Alternate Route) would save the motorists about $19,000 per year in traveling into or from that city. These savings also occur for the reason that the greater part of the trips origins or destinations are located in the zones which are closer to or are served better by the south line. The origin-destination survey for that city shows that 79% of the trips were concerned with zones which would be served best by the South Route.

These savings are not significant in relation to the other costs involved for the alternate routes, but they do provide further support for the South Route.

The economic factors and other considerations conclusively support the South Route as the location for the Interstate System highway between Livingston and Billings.

EXPLANATION OF MATERIAL IN APPENDIX

1. ROUTE MAP

This map shows the general area from Livingston to Billings through which the alternate Interstate routes are located, and it also shows the locations of the separate routes.

The North Route is shown as a solid line from Livingston to Billings, with Roman numerals identifying the control sections for which the construction and right-of-way costs have been segregated and estimated.

The North Alternate Route follows the line of the North Route from the point of beginning west of Livingston to a point south of Halfbreed Lake National Wildlife Refuge. At this point, the route veers southeastward, as shown by the dashed line, to a point east of Laurel. Beyond this point the route follows the line of the South Route. Separate control sections for the North Alternate Route are shown as "A" and "B".

The South Route follows the solid line which is the location of the present U.S. # 10 highway. At points where the South Route deviates from the location of the present highway, the new alignment is shown by means of a dashed line. The control sections for the South Route are identified by Arabic numerals.

2. COST ESTIMATES

The route map is followed by a series of tables showing the estimated costs for construction and right-of-way for each route. These tables also show estimated costs for contingent highway improvement which is related to the main Interstate routes.

The first table presents a comparison of the overall costs involved for each route. Plate I shows the total for the North Route, and it is followed by Sheets 1 to 9 showing the costs for each control section on this route.

Plate II shows the total for the South Route, followed by Sheets 1 to 9 with details for control sections.

Plate III shows the total for the North Alternate Route, followed by Sheets A and B covering the section of highway from the North Route to a point east of Laurel. The details for other sections of the North Alternate Route are contained in Sheets 1 to 6 of Plate I for the North Route and Sheets 8 and 9 of Plate II for the South Route.

Plate IV presents a summary of the contingent costs involved for highway improvement related to the alternate Interstate routes. It is followed by Sheets 1 to 6 showing the details of cost computations.

3. AERIAL PHOTOGRAPHS

The cost estimate sheets are followed by a series of aerial photographs. These photographs are in lineal order from Livingston to Billings, and the last photograph presents enlarged detail for the Billings area. These photographs are included for the main purpose of showing the location of the North Route. Where coverage permits, sections of the South Route or present highway, are shown by means of a dashed line.

Legend
● Interchange
▲ R.R. Separation
River Bridge
Highway Separation
I
II
III
IV
V
VI
VII
VIII
IX
1
2
3
4
5
6
7
8
9
A
B
C
D
E
GALLATIN NATIONAL FOREST
CUSTER NATIONAL FOREST
CARBON COUNTY

LIVINGSTON - BILLINGS INTERSTATE ROUTE STUDY

Comparison of Estimated Costs
- Excluding Traffic Service Factors and Maintenance Costs -

DESCRIPTION	SOUTH ROUTE	NORTH ROUTE	ALTERNATE NORTH ROUTE
Principal Interstate Route	$49,817,000	$37,893,000	$41,969,000
Reconstruction of 95 Miles Existing US #10	Not Applicable	$ 7,600,000	$ 7,600,000
4-Lane Laurel to Billings	Not Applicable	$ 5,333,000	Not Applicable
West Billings Connection Project F-FG 228(13)	$ 3,117,000	$ 3,117,000	$ 3,117,000
27th Street Underpass	$ 1,700,000	$ 1,700,000	$ 1,700,000
27th Street Connection from South Billings	$ 400,000	Not Applicable	$ 400,000
27th Street Connection from North Billings	Not Applicable	$ 300,000	Not Applicable
System Totals	$55,034,000	$55,934,000	$54,786,000

NORTH ROUTE TOTALS

SECTION Livingston to Billings

I through IX

Length in Miles	110.0
Miles of 4-lane	29.5
Total Estimated Cost of Section	$37,893,000
Average Total Cost Per Mile	$ 344,482
Total Roadway Cost	$27,492,000
Total Structure Cost	$ 7,540,000
Total R/W Cost	$ 2,861,000
Average R/W Cost Per Mile	$ 26,000
Average Roadway Cost Per Mile	$ 250,000
Acres Irrigated Land	270
Average Age of Existing Route	--

NOTE: Average roadway cost per mi. includes engineering, grading, draining, base course, surfacing, fencing, local access features, frontage road and stockpasses as required. This roadway cost for each section is a deliberated amount based primarily upon terrain classifications and comparisons to similar sections of the system upon which detailed costs have been established by contracted projects or in the 108(d) Estimate.

The structure lengths and unit prices used are the reflection of the actual costs for Interstate structures under contract or completed up to date.

PLATE I

COVER FOR NORTH ROUTE ESTIMATE SHEETS 1 THRU 9

SECTION Moderately Rough to Rolling Terrain
Livingston to Shields River

I

Length in Miles	7.5
Miles of 4-lane	3.5
Total Estimated Cost of Section	$3,630,000
Average Total Cost Per Mile	$ 484,000
Total Roadway Cost	$1,850,000
Total Structure Cost	$1,680,000
Total R/W Cost	$ 100,000
Average R/W Cost Per Mile	$ 13,000
Average Roadway Cost Per Mile	$ 247,000
Acres Irrigated Land	30
Average Age of Existing Route	--

4 mi. 2-lane at $200,000 and 3.5 mi. 4-lane at $300,000 = $1,850,000

2 interchanges on 4-lane section approximately	700	Lin. Ft. of Structure
1 interchange on 2-lane section approximately	200	Lin. Ft. of Structure
1 RR separation on 4-lane section approximately	700	Lin. Ft. of Structure
1 RR separation on 2-lane section approximately	300	Lin. Ft. of Structure
1 highway separation on 4-lane approximately	200	Lin. Ft. of Structure
Total =	2,100	Lin. Ft. Structures

2,100 Lin. Ft. of Structures at $800 per Lin. Ft. =$1,680,000

NORTH ROUTE

Rough to Moderately Rough Terrain
SECTION Shields River to Duck Creek

II

Length in Miles	14.8
Miles of 4-lane	0
Total Estimated Cost of Section	$3,914,000
Average Total Cost Per Mile	$ 264,000
Total Roadway Cost	$3,404,000
Total Structure Cost	$ 440,000
Total R/W Cost	$ 70,000
Average R/W Cost Per Mile	$ 5,000
Average Roadway Cost Per Mile	$ 230,000
Acres Irrigated Land	40
Average Age of Existing Route	--

Shield River Bridge approximately	250	Lin. Ft. of Structure
1 2-lane interchange approximately	200	Lin. Ft. of Structure
1 bridge at Duck Creek approximately	100	Lin. Ft. of Structure
Total =	550	Lin. Ft. of Structures

550 Lin. Ft. at $800 = $440,000

NORTH ROUTE

SECTION Rough to Moderately Rough Terrain
Duck Creek to Big Timber III

Length in Miles	12.7
Miles of 4-lane	2.5
Total Estimated Cost of Section	$3,479,000
Average Total Cost Per Mile	$ 274,000
Total Roadway Cost	$3,119,000
Total Structure Cost	$ 280,000
Total R/W Cost	$ 80,000
Average R/W Cost Per Mile	$ 6,000
Average Roadway Cost Per Mile	$ 246,000
Acres Irrigated Land	110
Average Age of Existing Route	--

1 interchange and 1 river bridge 350 Lin. Ft. at $800 = $280,000
2.5 mi. 4-lane at$350,000 per mi. $ 875,000
10.2 mi. 2-lane at$220,000 per mi.$2,244,000

NORTH ROUTE

SECTION Rolling to Moderately Rough Terrain
Big Timber to Sweetgrass Creek IV

Length in Miles	9.2
Miles of 4-lane	0
Total Estimated Cost of Section	$2,454,000
Average Total Cost Per Mile	$ 267,000
Total Roadway Cost	$2,208,000
Total Structure Cost	$ 200,000
Total R/W Cost	$ 46,000
Average R/W Cost Per Mile	$ 5,000
Average Roadway Cost Per Mile	$ 240,000
Acres Irrigated Land	50
Average Age of Existing Route	—

2 river bridges 250 Lin. Ft. at $800 = $200,000

NORTH ROUTE

Semi-mountainous Terrain - Rough
SECTION Sweetgrass Creek to White Beaver Creek

V

Length in Miles	10.6
Miles of 4-lane	6.0
Total Estimated Cost of Section	$3,582,000
Average Total Cost Per Mile	$ 338,000
Total Roadway Cost	$3,550.00
Total Structure Cost	0
Total R/W Cost	$ 32,000
Average R/W Cost Per Mile	$ 3,000
Average Roadway Cost Per Mile	$ 335,000
Acres Irrigated Land	0
Average Age of Existing Route	--

6 mi. 4-lane at $400,000 per mi. =$2,400,000
4.6 mi. 2-lane at $250,000 per mi. = $1,150,000

NORTH ROUTE

Rolling Terrain
SECTION White Beaver Creek to Junction of FAS 306 VI

Length in Miles	14.0
Miles of 4-lane	0
Total Estimated Cost of Section	$2,872,000
Average Total Cost Per Mile	$ 205,000
Total Roadway Cost	$2,520,000
Total Structure Cost	$ 240,000
Total R/W Cost	$ 112,000
Average R/W Cost Per Mile	$ 8,000
Average Roadway Cost Per Mile	$ 180,000
Acres Irrigated Land	0
Average Age of Existing Route	—

1 interchange and 1 river bridge 300 Lin. Ft. Structure at $800 = $240,000

NORTH ROUTE

Rolling Terrain

SECTION FAS 306 to 3 miles east of Northern Pacific RR Crossing VII

Length in Miles	18.7
Miles of 4-lane	0
Total Estimated Cost of Section	$3,752,000
Average Total Cost Per Mile	$ 201,000
Total Roadway Cost	$3,366,000
Total Structure Cost	$ 240,000
Total R/W Cost	$ 146,000
Average R/W Cost Per Mile	$ 8,000
Average Roadway Cost Per Mile	$ 180,000
Acres Irrigated Land	0
Average Age of Existing Route	--

1 RR Crossing 300 Lin. Ft. at $800 = $240,000

NORTH ROUTE

Rough Climbing Out of Large Basin
SECTION 3 mi. east of RR Crossing to Crossing of Zimmerman Trail VIII

Length in Miles	15.5
Miles of 4-lane	10.5
Total Estimated Cost of Section	$5,790,000
Average Total Cost Per Mile	$ 374,000
Total Roadway Cost	$4,675,000
Total Structure Cost	$1,040,000
Total R/W Cost	$ 75,000
Average R/W Cost Per Mile	$ 5,000
Average Roadway Cost Per Mile	$ 302,000
Acres Irrigated Land	0
Average Age of Existing Route	--

10 miles 4-lane at $350,000 and 5 miles 2-lane at $200,000 = $4,500,000
2 4-lane interchanges 600 Lin. Ft. Structures
1 4-lane RR crossing structure 700 Lin. Ft

1,300 Lin. Ft. at $800 = $1,040,000

NORTH ROUTE

Zimmerman Trail to Junction with Present US #87
Side Hill Section Along Toe of High Rim Rock

SECTION Through Edge of North Billings Residential Area IX

Length in Miles	7.0
Miles of 4-lane	7.0
Total Estimated Cost of Section	$8,420,000
Average Total Cost Per Mile	$1,203,000
Total Roadway Cost	$2,800,000
Total Structure Cost	$3,420,000
Total R/W Cost	$2,200,000
Average R/W Cost Per Mile	$ 314,000
Average Roadway Cost Per Mile	$ 400,000
Acres Irrigated Land	40
Average Age of Existing Route	--

NOTE: By photo examination approximately 90 homes and 4 to 6 industrial properties will be within the required R/W, including interchange areas at 27th Street and US #10 Junction near Fairgrounds;

100 properties at $15,000 each = $1,500,000
industrial properties = 500,000
utility adjustments = 200,000

Total = $2,200,000

Estimated 4-lane roadway at $400,000 per mi. = $2,800,000.

4-lane separation at Zimmerman Trail 300 Lin. Ft. Structure at $800,000 = $ 240,000
27th Street Interchange and connection = $ 400,000
US #10 Interchange and connection = $ 400,000
RR separation near Fairgrounds 500 Lin. Ft. at $800 = $ 400,000
4-lane Yellowstone River Bridge, 1,500 Lin. Ft. at $1,000 = $1,500,000
4-lane RR separation and interchange near Junction of US #87, 600 Lin. Ft. at $800 = $ 480,000

Totals = $3,420,000

SOUTH ROUTE TOTALS

SECTION Livingston to Billings

1 through 9

Length in Miles	124.5
Miles of 4-lane	54.7
Total Estimated Cost of Section	$49,817,000
Average Total Cost Per Mile	$ 400,000
Total Roadway Cost	$31,886,000
Total Structure Cost	$10,398,000
Total R/W Cost	$ 7,533,000
Average R/W Cost Per Mile	$ 61,000
Average Roadway Cost Per Mile	$ 256,000
Acres Irrigated Land	1130
Average Age of Existing Route	--

NOTE: Roadway costs are composed of all costs from the 108(d) except the R/W and structure items and various noted adjustments reflecting actual design and contract amounts.

Structure costs are based upon the approximate average lengths and average costs reflected by Interstate projects designed and contracted up to date.

Adjustments of the 108(d) R/W costs are approximately according to the reflected comparison of such costs with actual purchases up to date.

PLATE II

COVER FOR SOUTH ROUTE ESTIMATE SHEETS 1 THRU 9

SOUTH ROUTE

SECTION Livingston to Mission C - 11 to C - 15 1.

Length in Miles	10.7
Miles of 4-lane	10.7
Total Estimated Cost of Section	$6,364,000
Average Total Cost Per Mile	$ 595,000
Total Roadway Cost	$3,210,000
Total Structure Cost	$2,424,000
Total R/W Cost	$ 730,000
Average R/W Cost Per Mile	$ 68,000
Average Roadway Cost Per Mile	$ 300,000
Acres Irrigated Land	30
Average Age of Existing Route	27

Yellowstone River Bridges 1,430 Lin. Ft.
Combination RR separation & interchange 400 Lin. Ft.
3 interchanges and 1 separation structure 1,200 Lin. Ft.
Total of 3,030 Lin. Ft. Structures at $800 =
$2,424,000

$300,000 per mi. roadway cost is considered reasonable based upon the terrain involved.

This estimate does not use the 108(d) amounts for the sections indicated since the established route was shifted considerably from the one estimated in the 108(d) Study.

SOUTH ROUTE

SECTION Mission to Springdale C - 15 to D - 1 2.

Length in Miles	13.2
Miles of 4-lane	3.5
Total Estimated Cost of Section	$3,752,000
Average Total Cost Per Mile	$ 284,000
Total Roadway Cost	$3,547,000
Total Structure Cost	$ 70,000
Total R/W Cost	$ 135,000
Average R/W Cost Per Mile	$ 10,000
Average Roadway Cost Per Mile	$ 269,000
Acres Irrigated Land	100
Average Age of Existing Route	New

1 River Bridge at Mission Creek 100 Lin. Ft. at $700
Actual costs for contracted work and R/W purchased are reflected, including Springdale Hill E.W.O.

SOUTH ROUTE

SECTION Springdale to Big Timber D - 1 to D - 3 3.

Length in Miles	17.1
Miles of 4-lane	0
Total Estimated Cost of Section	$2,760,000
Average Total Cost Per Mile	$ 161,000
Total Roadway Cost	$1,800,000
Total Structure Cost	$ 800,000
Total R/W Cost	$ 160,000
Average R/W Cost Per Mile	$ 9,000
Average Roadway Cost Per Mile	$ 105,000
Acres Irrigated Land	100
Average Age of Existing Route	3

3 interchanges	400	Lin. Ft. Structure
2 separations	300	Lin. Ft. Structure
2 bridges	300	Lin. Ft. Structure

Total = 1,000 Lin. Ft. at $800 = $800,000

R/W on 108(d) Estimate increased by 100%
Several irrigated farms are involved near Big Timber.

The salvage of the existing road makes this section low in cost, approximately 14 miles only require shoulder widening and acquiring of R/W on basis of full access control.

Roadway, surfacing and miscellaneous costs same as 108(d) Estimate.

SOUTH ROUTE

SECTION Big Timber to Reed Point D - 3 to D - 5 4.

Length in Miles	20.0
Miles of 4-lane	0
Total Estimated Cost of Section	$4,353,000
Average Total Cost Per Mile	$ 218,000
Total Roadway Cost	$3,375,000
Total Structure Cost	$ 480,000
Total R/W Cost	$ 498,000
Average R/W Cost Per Mile	$ 25,000
Average Roadway Cost Per Mile	$ 169,000
Acres Irrigated Land	150
Average Age of Existing Route	31

2 interchange separation structures	300 Lin. Ft.
3 small stream bridges	300 Lin. Ft.
Total	600 Lin. Ft. at $800 =$480,000

R/W of section 108(d) Estimate increased by 50%.

Roadway, surfacing and miscellaneous costs same as 108(d).

SOUTH ROUTE

SECTION Reed Point to Columbus D - 5 to D - 8 5.

Length in Miles	16.1
Miles of 4-lane	3.1
Total Estimated Cost of Section	$5,222,000
Average Total Cost Per Mile	$ 324,000
Total Roadway Cost	$3,692,000
Total Structure Cost	$1,200,000
Total R/W Cost	$ 330,000
Average R/W Cost Per Mile	$ 20,000
Average Roadway Cost Per Mile	$ 229,000
Acres Irrigated Land	150
Average Age of Existing Route	26

2 interchange structures (one 4-lane & one 2-lane)	600 Lin. Ft.
1 Yellowstone River Bridge	600 Lin. Ft.
1 RR separation	300 Lin. Ft.
Total	1,500 Lin. Ft.

1,500 Lin. Ft. at $800 = $1,200,000

R/W of 108(d) increased by 100% because the land segregation damage west of Columbus is quite extensive.

Section 108(d) costs used except for structure and R/W.

SOUTH ROUTE

SECTION Columbus to Park City D - 8 to D - 10 6.

Length in Miles	17.3
Miles of 4-lane	7.3
Total Estimated Cost of Section	$7,120,000
Average Total Cost Per Mile	$ 412,000
Total Roadway Cost	$6,100,000
Total Structure Cost	$ 720,000
Total R/W Cost	$ 300,000
Average R/W Cost Per Mile	$ 17,000
Average Roadway Cost Per Mile	$ 353,000
Acres Irrigated Land	120
Average Age of Existing Route	27

2 interchanges and 1 separation structure 900 Lin. Ft. at $800 = $720,000.

R/W of 108(d) increased by 100% to reflect relationship of actual purchases to 108(d) Estimate amounts through farm lands.

Two short sections of fairly rugged terrain are involved.

SOUTH ROUTE

SECTION Park City to Laurel D - 10 to D - 12+2 7.

Length in Miles	13.6
Miles of 4-lane	13.6
Total Estimated Cost of Section	$6,040,000
Average Total Cost Per Mile	$ 444,000
Total Roadway Cost	$4,080,000
Total Structure Cost	$1,360,000
Total R/W Cost	$ 600,000
Average R/W Cost Per Mile	$ 44,000
Average Roadway Cost Per Mile	$ 300,000
Acres Irrigated Land	200
Average Age of Existing Route	33

2 interchanges and 1 separation structure 900 Lin. Ft. at $800 = $720,000.

2 RR separation structures 800 Lin. Ft. at $800 = $640,000

R/W of 108(d) Estimate increased by approximately 100%.

SOUTH ROUTE

SECTION Laurel to Billings D - 12+2 8.

Length in Miles	10.4
Miles of 4-lane	10.4
Total Estimated Cost of Section	$7,232,000
Average Total Cost Per Mile	$ 695,000
Total Roadway Cost	$3,700,000
Total Structure Cost	$ 852,000
Total R/W Cost	$2,680,000
Average R/W Cost Per Mile	$ 258,000
Average Roadway Cost Per Mile	$ 356,000
Acres Irrigated Land	200
Average Age of Existing Route	30

A section from Mossmain to Billings (6.4 mi.) is designed and expected to be contracted in May or June.

Costs are based upon actual design quantities, R/W negotiations and actual structure contracts of this 6.4 mi. section projected to reflect the total section.

Includes construction of north and south frontage roads.

Does not include the West Billings Interchange.

Structures contracted to date	$442,000
Structures to be let that are designed	$250,000
Mossmain Interchange 200 Lin. Ft. at $800	$160,000
Total	$852,000

Roadway surfacing etc. on 6.4 mi. designed $2,500,000 or approximately $400,000 per mi.-use $300,000 per mi. for 4.0 mi. (Laurel-Mossmain Section) since there are very few frontage roads in this section. $300,000 X 4.0 = $1,200,000---Total roadway = $3,700,000.

Utilities	80,000	
R/W - actual	$1,300,000	
R/W - appraisals	500,000	
R/W - estimated	800,000	
Total	$2,680,000	R/W & Utilities

SOUTH ROUTE

SECTION Billings to Junction US #87 east of Yellowstone River
D - 14 to D - 15 + 1.5 9.

Length in Miles	6.1
Miles of 4-lane	6.1
Total Estimated Cost of Section	$6,974,000
Average Total Cost Per Mile	$1,143,000
Total Roadway Cost	$2,382,000
Total Structure Cost	$2,492,000
Total R/W Cost	$2,100,000
Average R/W Cost Per Mile	$ 344,000
Average Roadway Cost Per Mile	$ 390,000
Acres Irrigated Land	80
Average Age of Existing Route	10

$1,252,000 total estimated for West Billings Interchange, including R/W at $400,000 and structure at $300,000.

West Billings Interchange =	$ 300,000
2 separation structures - 400 Lin. Ft. at $800 =	$ 320,000
2 interchange structures - 400 Lin. Ft. at $800 =	$ 320,000
Yellowstone River (double 970') 1940 =	$1,552,000
Total	$2,492,000

108(d) roadway estimate for this section is approximately
$300,000 per mi. - 6.1 X $300 = $1,830,000
West Billings Interchange roadway = $ 552,000

Total roadway = $2,382,000

R/W from 108(d) = $1,700,000
West Billings Interchange R/W = $ 400,000

Total R/W = $2,100,000

ALTERNATE NORTH ROUTE VIA LAUREL TOTALS

SECTION I to VI, A, B, 8 & 9

Length in Miles	114.8
Miles of 4-lane	37.8
Total Estimated Cost of Section	$41,969,000
Average Total Cost Per Mile	$ 366,000
Total Roadway Cost	$29,563,000
Total Structure Cost	$ 6,824,000
Total R/W Cost	$ 5,582,000
Average R/W Cost Per Mile	$ 49,000
Average Roadway Cost Per Mile	$ 258,000
Acres Irrigated Land	610
Average Age of Existing Route	--

Totals are amounts from Plate I, Sheets 1 thru 6; Plate II, Sheets 8 & 9; and Plate III, Sheets 1 & 2.

PLATE III

COVER FOR ALTERNATE ROUTE ESTIMATE SHEETS 1 & 2

ALTERNATE NORTH ROUTE VIA LAUREL

Junction FAS 306 to Yellowstone County Line
SECTION Rolling to Moderately Rough Terrain

A.

Length in Miles	20.2
Miles of 4-lane	0
Total Estimated Cost of Section	$4,202,000
Average Total Cost Per Mile	$ 208,000
Total Roadway Cost	$4,040,000
Total Structure Cost	none
Total R/W Cost	$ 162,000
Average R/W Cost Per Mile	$ 8,000
Average Roadway Cost Per Mile	$ 200,000
Acres Irrigated Land	0
Average Age of Existing Route	--

ALTERNATE NORTH ROUTE

SECTION Moderately Rough Terrain Escept in the Valley
Yellowstone County Line to Laurel

B.

Length in Miles	9.3
Miles of 4-lane	9.3
Total Estimated Cost of Section	$3,630,000
Average Total Cost Per Mile	$ 390,000
Total Roadway Cost	$2,790,000
Total Structure Cost	$ 640,000
Total R/W Cost	$ 200,00
Average R/W Cost Per Mile	$ 22,000
Average Roadway Cost Per Mile	$ 300,000
Acres Irrigated Land	100
Average Age of Existing Route	--

1 interchange 300 Lin. Ft. and 1 RR separation 500 Lin. Ft.
800 Lin. Ft. Structure at $800 = $640,000.

OTHER COSTS INVOLVED

DESCRIPTION	TOTAL ESTIMATED COST
West Billings Connection Sec. C.	$3,117,000
27th Street Connection from North Billings Sec. D.	$ 300,000
27th Street Connection South Billings Sec. E.	$ 400,000
27th Street Underpass in Billings Sec. F.	$1,700,000
95 mi. Reconstruction Existing US #10	$7,600,000
12 mi. 4-Lane Laurel to Billings	$5,333,000

PLATE IV

COVER FOR OTHER COSTS ESTIMATE SHEETS 1 THRU 6

OTHER COSTS INVOLVED

North, South & Alternate North Routes

SECTION West Billings Connection Project F-FG 228(13)

C.

Length in Miles	1.5
Miles of 4-lane	1.5
Total Estimated Cost of Section	$3,117,000
Average Total Cost Per Mile	--
Total Roadway Cost	$ 575,000
Total Structure Cost	$1,775,000
Total R/W Cost	$ 767,000
Average R/W Cost Per Mile	--
Average Roadway Cost Per Mile	--
Acres Irrigated Land	--
Average Age of Existing Route	--

Overpass is under contract $1,164,775.51.

Underpass as designed and estimated by quantity items is $610,000.00.

Roadway as designed and estimated by quantity items is $575,000.

R/W based upon approximately 80% negotiation is $767,000.

This construction is required for whatever route is developed.

Primary road funds.

OTHER COSTS INVOLVED

North Route Only

SECTION 27th Street Connection from North Billings

D.

Length in Miles	1.4
Miles of 4-lane	1.4
Total Estimated Cost of Section	$ 300,000
Average Total Cost Per Mile	--
Total Roadway Cost	$ 200,000
Total Structure Cost	--
Total R/W Cost	$ 100,000
Average R/W Cost Per Mile	--
Average Roadway Cost Per Mile	--
Acres Irrigated Land	--
Average Age of Existing Route	--

Use existing R/W - May be damages involved so $100,000 is allowed.

Roadway cost covers estimated utility moves, curbing and paving to provide 4-lane divided roadway without parking where 4 lanes undivided now exists.

Primary road funds.

OTHER COSTS INVOLVED

South Route & Alternate North Route

SECTION 27th Street Connection from South Billings

	E.
Length in Miles	1.0
Miles of 4-lane	1.0
Total Estimated Cost of Section	$ 400,000
Average Total Cost Per Mile	--
Total Roadway Cost	$ 200,000
Total Structure Cost	--
Total R/W Cost	$ 200,000
Average R/W Cost Per Mile	--
Average Roadway Cost Per Mile	--
Acres Irrigated Land	--
Average Age of Existing Route	--

R/W involves approximately 20 residences through a sub-standard area.

Primary road funds.

OTHER COSTS INVOLVED

North, South & Alternate North Routes

SECTION 27 Street Underpass

F.

Length in Miles	0.1
Miles of 4-lane	0.1
Total Estimated Cost of Section	$1,700,000
Average Total Cost Per Mile	--
Total Roadway Cost	$ 300,000
Total Structure Cost	$ 900,000
Total R/W Cost	$ 500,000
Average R/W Cost Per Mile	--
Average Roadway Cost Per Mile	--
Acres Irrigated Land	--
Average Age of Existing Route	--

Approximately 300 Lin. Ft. Underpass at $3,000 per Lin. Ft. for 4 lanes.

Street connection L.S. $300,000.

R/W might involve four business properties estimated at $100,000 - use $500,000 total R/W.

Primary road funds.

OTHER COSTS INVOLVED

SECTION Livingston to Laurel
Reconstruction of Existing US #10

Length in Miles	95
Miles of 4-lane	--
Total Estimated Cost of Section	$ 7,600,000
Average Total Cost Per Mile	$ 80,000
Total Roadway Cost	$ 5,350,000
Total Structure Cost	$ 1,500,000
Total R/W Cost	$ 750,000
Average R/W Cost Per Mile	--
Average Roadway Cost Per Mile	--
Acres Irrigated Land	--
Average Age of Existing Route	25

Excludes Sprindale to Big Timber Section and Laurel to Billings Section.

Structure amount provides a new river bridge and RR overpass east of Reed Point and miscellaneous stream crossings along the route where realignment is required to improve standards.

R/W amount is to cover the realignment sections that are needed to improve standards.

Most of the roadway cost would be for widening of existing roadbed, base course and surfacing.

OTHER COSTS INVOLVED

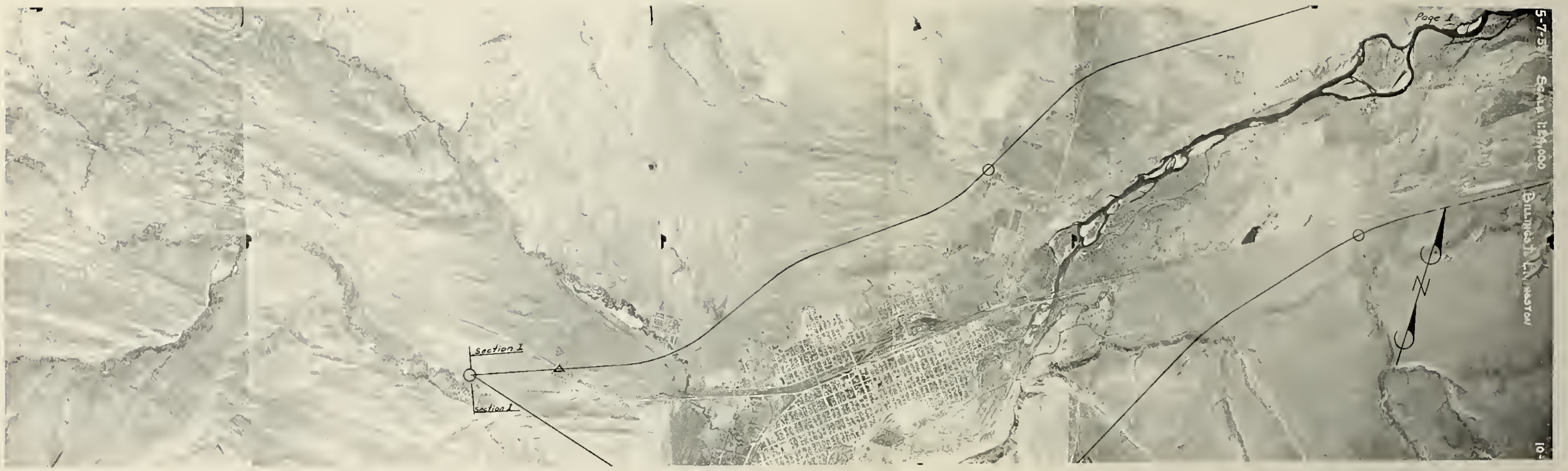
SECTION Laurel to Billings
4-lanes of Semi-Controlled Access

Length in Miles	12.0
Miles of 4-lane	12.0
Total Estimated Cost of Section	$ 5,333,000
Average Total Cost Per Mile	$ 444,000
Total Roadway Cost	$ 3,600,000
Total Structure Cost	$ 250,000
Total R/W Cost	$ 1,483,000
Average R/W Cost Per Mile	$ 1,000
Average Roadway Cost Per Mile	$ 300,000
Acres Irrigated Land	--
Average Age of Existing Route	--

With semi-controlled access standards, the Shiloh overpass, the beet dump separation, the Mossmain Interchange structure and the West Billings Interchange structure would not be required.

Most of the south frontage road and some short sections of the north frontage road should be provided.

Approximately 2/3 of the amount estimated for the Interstate is considered reasonable.
2/3 of $8,000,000 = $5,333,000.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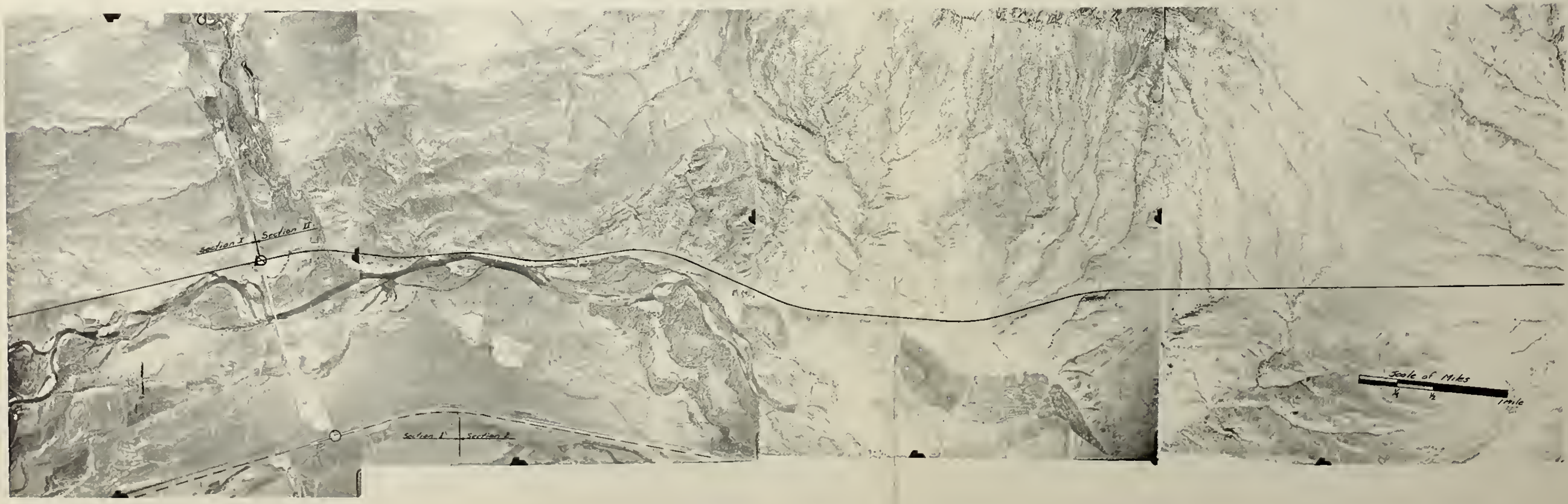
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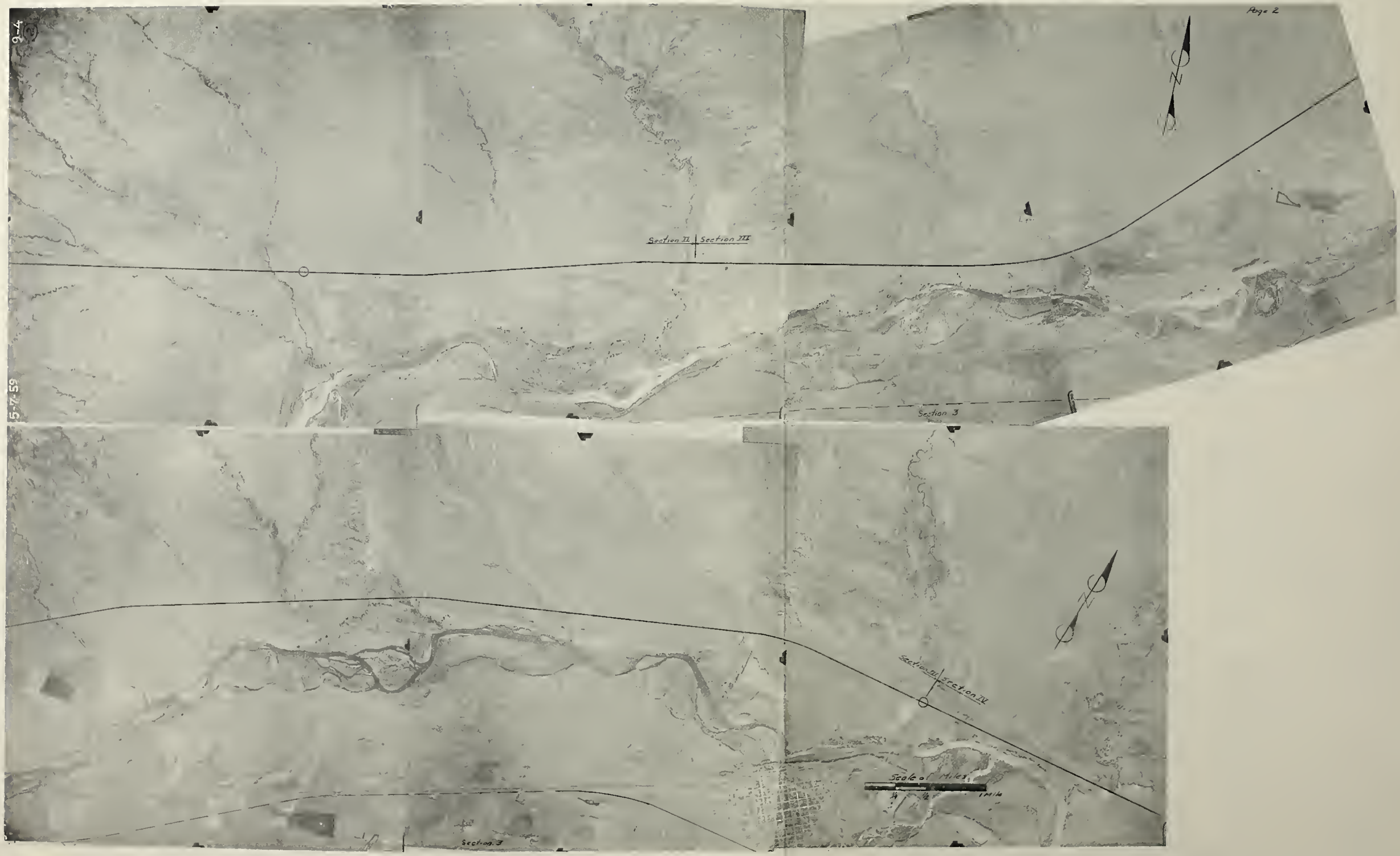
1/2
1 mile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Section III
Section 3
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Section III
Section IV
Scale of Miles
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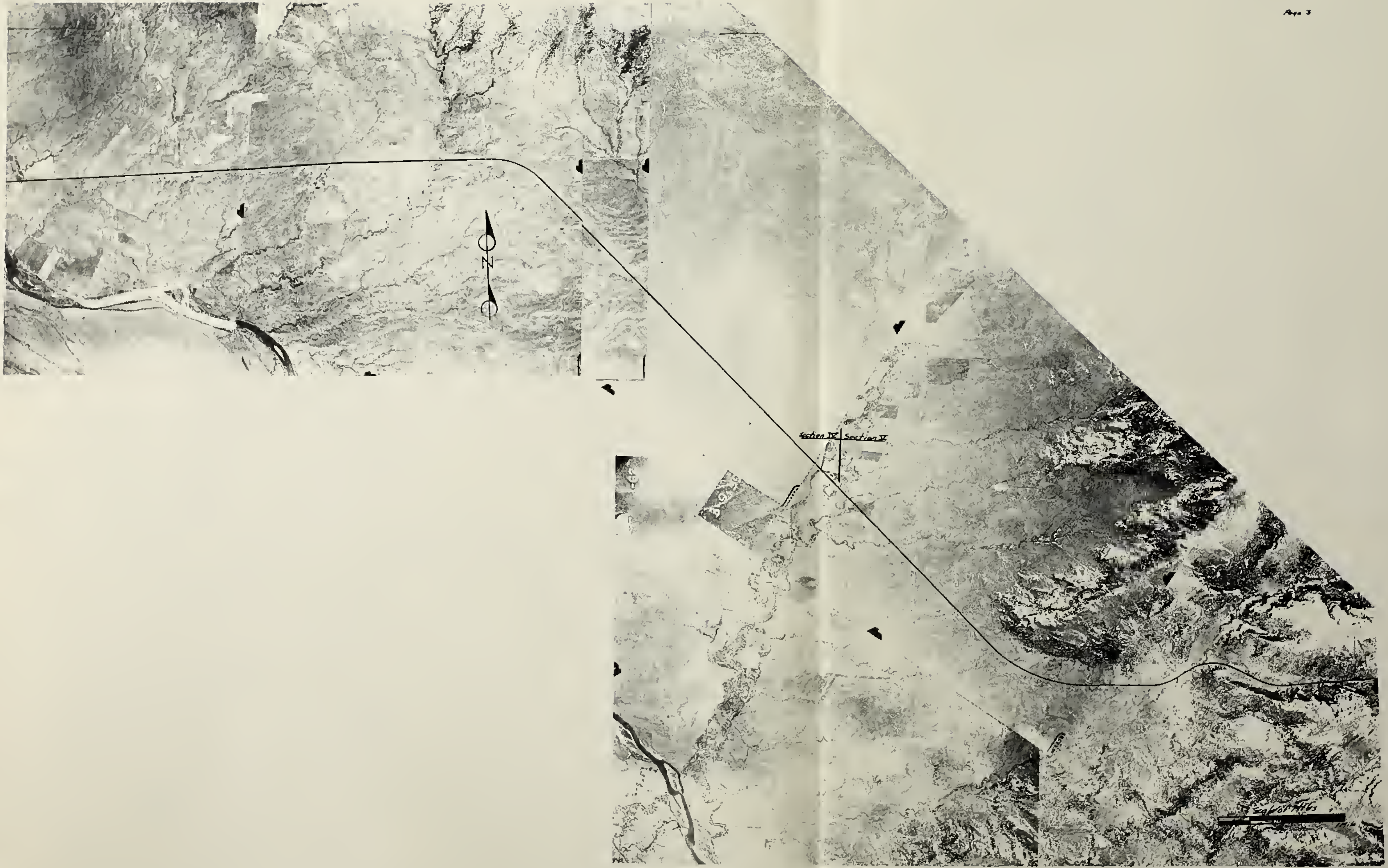
1/2
1 Mile
Section 3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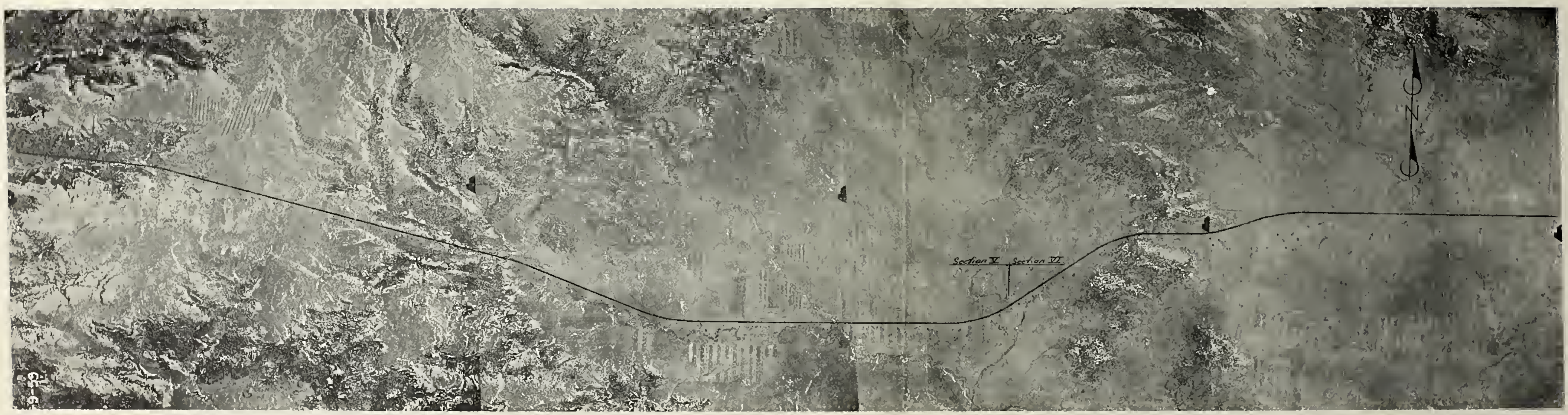
Section V
Scale of Miles
1 Mile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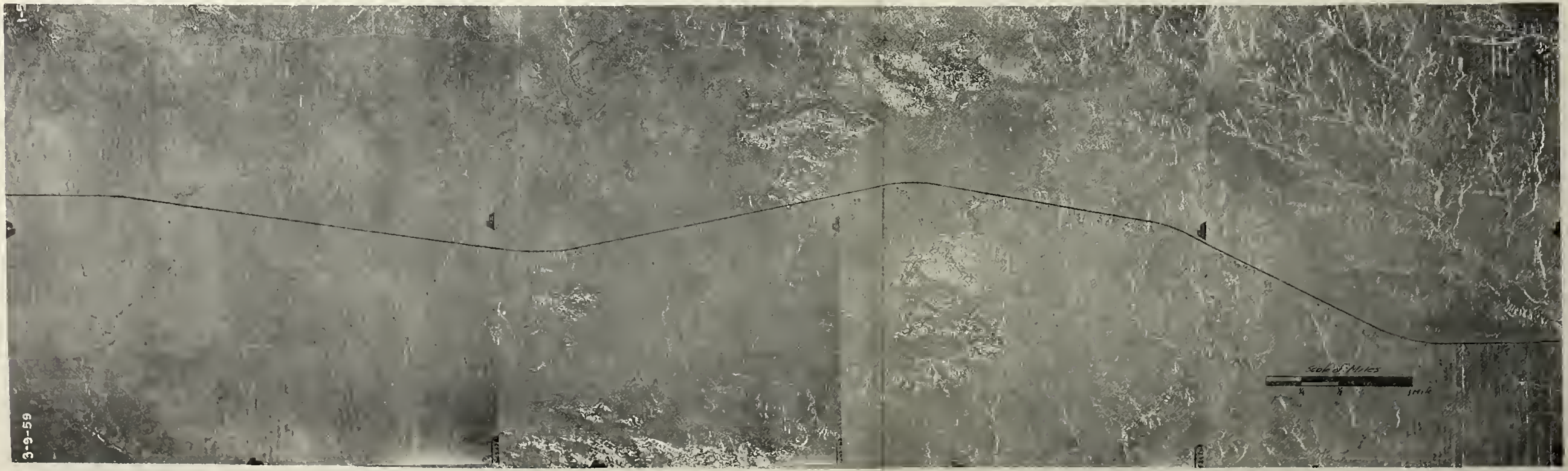
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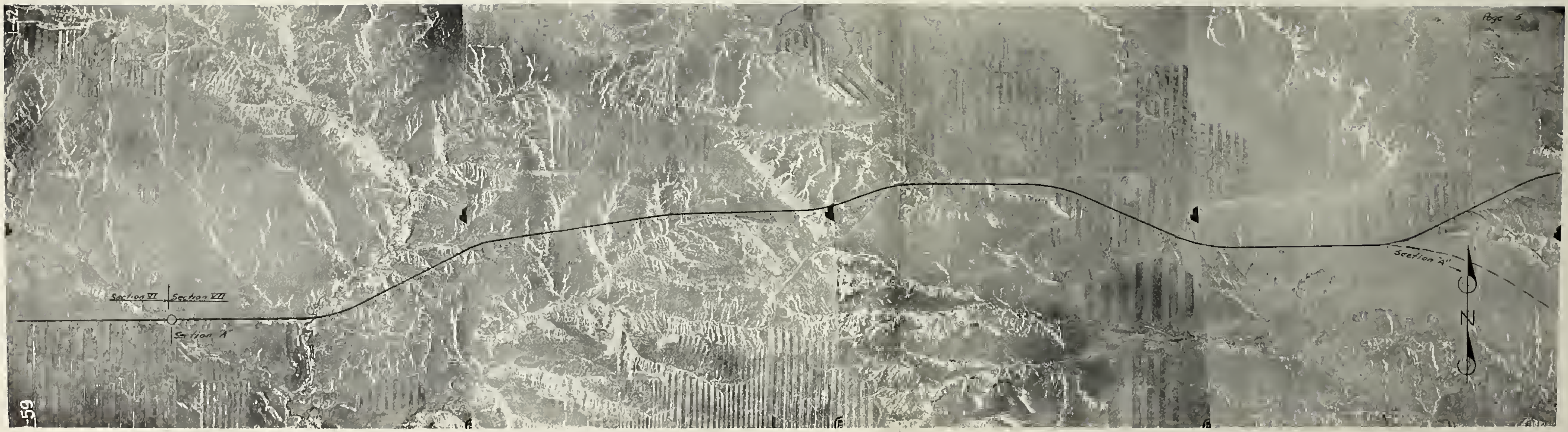
1/4
1/2
1 Mile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Section VII
Section A
Section A'
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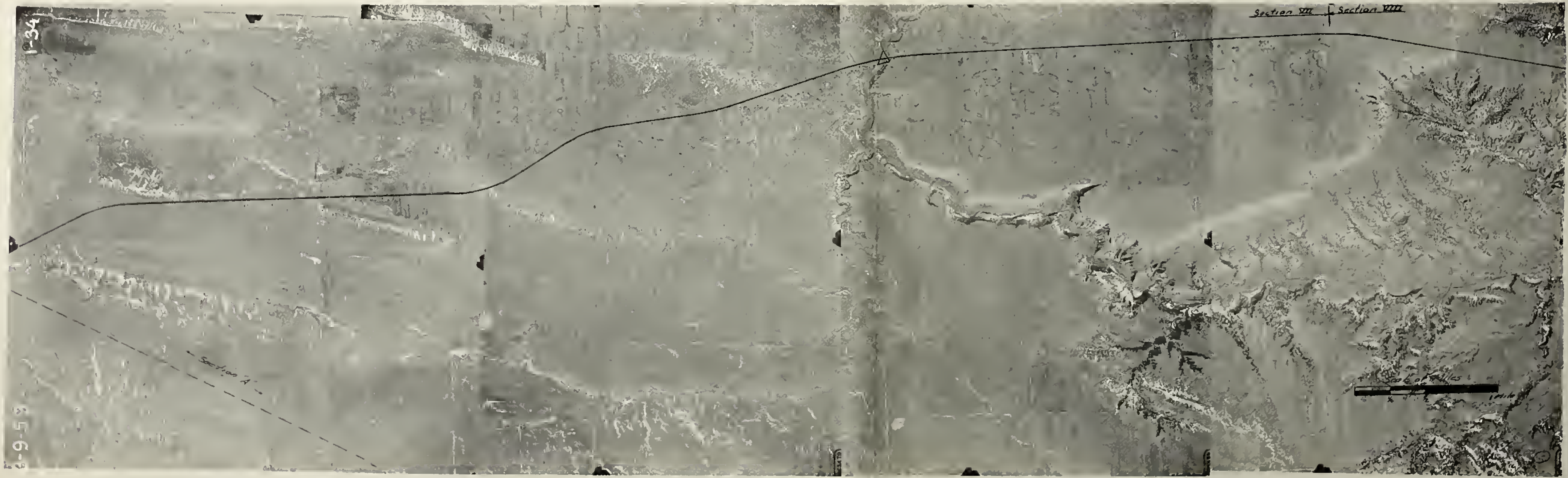
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Scale of Miles
1 mile
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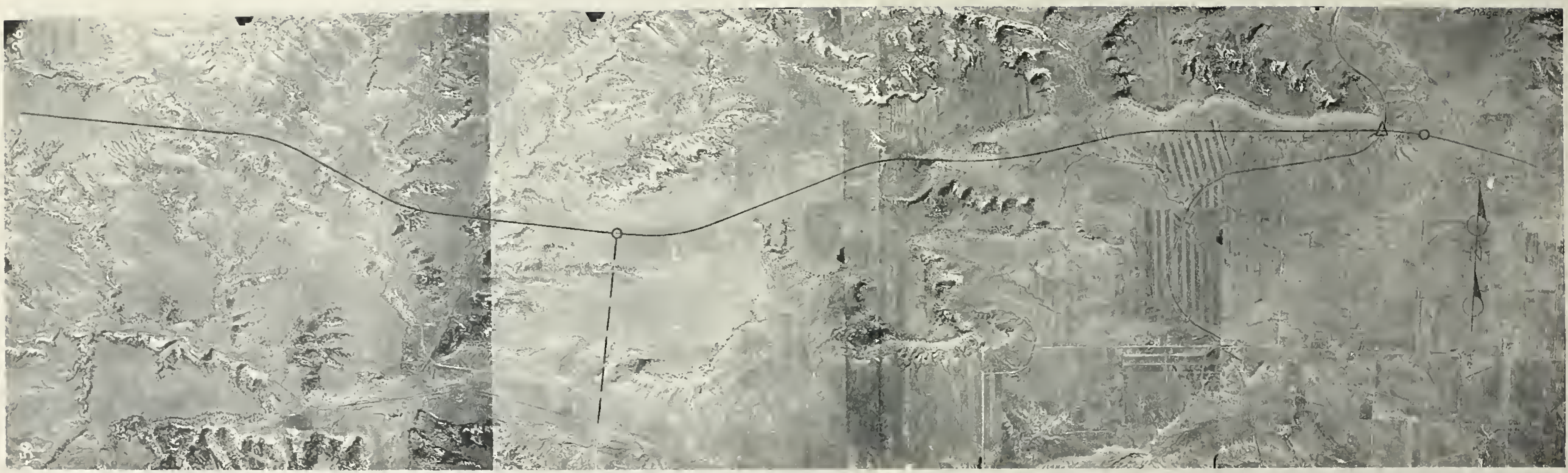
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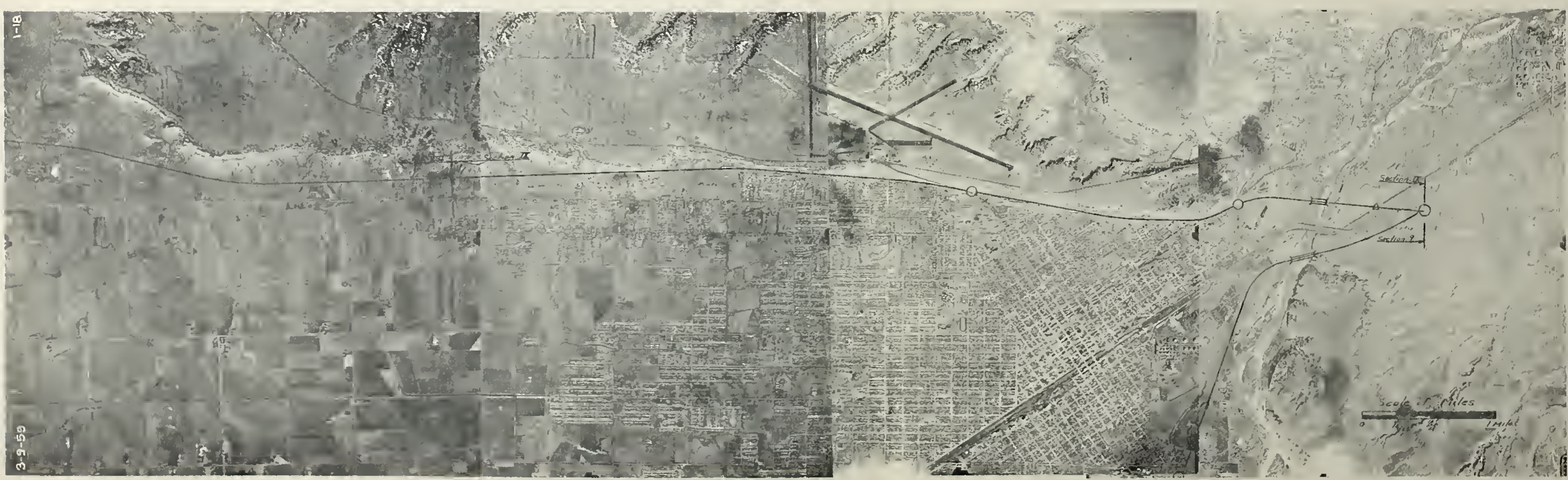
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Section II
Section I
Scale of Miles
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1 mile

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T.2S. R.24E.
1480+00
1060+
Sec 7 | Sec 6
T.1S. R.25E.

B
1665+00